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ABSTRACT

This proceeding contains the following session topics: communicating technology, extension curricula, rural development, adoption of innovations, instructional technology, communications technologies, international education; extension programming, extension training, and technology transfer. (CCM)

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1997 Conference Papers

13th Annual Conference

3, 4, 5 April 1997
Arlington, Virginia

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1997 Conference

Refereed Papers

13th Annual Conference

3, 4, 5 April 1997
Arlington, Virginia

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1997 Annual Conference Concurrent Sessions

THURSDAY, April 3, 1997, 3:30-5:30 pm

Session A	COMMUNICATING TECHNOLOGY- ***Jefferson Room***
Session B	EXTENSION CURRICULA - ***Adams Room***
Session C	RURAL DEVELOPMENT - ***Kennedy Room***
Session D	ADOPTION OF INNOVATIONS - ***Roosevelt Room***
Session E	INSTRUCTIONAL TECHNOLOGY - ***Lincoln Room***

THURSDAY, April 3, 1997 6-8 pm POSTER SESSION -***Jefferson Room***

FRIDAY April 4, 1997, 10:30-12:30 pm

Session F	COMMUNICATIONS TECHNOLOGIES - ***Lincoln Room***
Session G	INTERNATIONAL EDUCATION - ***Roosevelt Room***
Session H	EXTENSION PROGRAMMING - ***Kennedy Room***
Session I	EXTENSION TRAINING - ***Adams Room***
Session J	TECHNOLOGY TRANSFER - ***Jefferson Room***

Special Thanks

The membership of AIAEE wishes to express their appreciation to those who served as referees for the paper summaries submitted for the 1997 Annual Conference. Each of the paper summaries was judged and scored by a minimum of three peer reviewers. Forty papers were accepted for inclusion in this publication.

This year, several Association members agreed to share the leadership roles in securing peer reviews for the paper abstracts, by assisting in securing referees and in the overall management of the review process. We wish to thank the following individuals for their excellent leadership throughout the review process.

John Crunkilton
Layle Lawrence
Curtis Norenburg

Latif Laghari
Michael Newman

We also wish to express our appreciation to the many other Extension Education scholars who contributed to the review process. Their thorough reviews are commendable, and highly appreciated.

A special message of appreciation is expressed to those members who contributed to the scholarly activities of AIAEE by submitting proposals for papers or for posters. Your dedication to scholarship within the profession is commendable.

Another message of appreciation is extended to John Crunkilton for his leadership of the poster session, and to all of the other members who have responded so faithfully throughout the year as assistance and inputs were needed.

Finally, Mary Ann Lofgren and Kathy Moritz, secretaries for myself and Barbara Ludwig, respectively, deserve a truly grateful expression of gratitude from all members for their dedication and excellence in assisting in the many duties of AIAEE.

John G. Richardson,
Chair, Scholarly Activities Committee

ASSOCIATION FOR INTERNATIONAL AGRICULTURE AND EXTENSION EDUCATION

announces a
CALL FOR PAPERS

For the 13th Annual Conference of AIAEE in Washington, D. C. from 3-5 April, 1997

AIAEE will accept paper proposal summaries related to international agricultural and extension education issues. Topics related to the 1997 conference theme of "***Communication Technology Linking The World***" are encouraged, but all submissions will be given full consideration. Both research and philosophically-based papers will be considered. The summary should not exceed three double-spaced pages of text. In order to submit a proposal you must be an AIAEE member. Contact Dr. Jan Henderson, AIAEE Treasurer, The Ohio State University, 204 Ag Admin Bldg., 2120 Fyffe Road, Columbus, Ohio 43210-1067 concerning membership information, (Tel: 614-292-0450/Fax: 614-292-7007). Please contact both your professional in-country and international colleagues about the opportunity to submit a proposal. Each proposal requires the following information:
* Separate title page with names (full contact information, including mailing address, fax number and telephone number of the author responsible for receiving communications from AIAEE. E-mail address is highly desirable.
* Introduction
* Purpose of paper
* Methods and data sources; or, theoretical/philosophical themes (the problem or issues, with attention to the arguments used)
* Results and/or conclusions
* Educational importance
* 4 copies of the paper proposal must be included
* More than one proposal may be included
Deadline for submission of paper proposals is October 15, 1996. Send paper proposals to: Dr. John Richardson, Department of Agricultural and Extension Education, Box 7607, NC State University, Raleigh, NC 27695-7607. Tel: 919-515-2380/Fax: 919-515-1965. E-mail is < jgrichar@amaroq.ces.ncsu.edu >. Each paper proposal will be peer reviewed by three AIAEE members. Corresponding authors of paper proposals will be notified during December 1996, and paper specifications given to those accepted for presentation. Presenters will be required to register for and pay the conference registration charge.

We also issue a **CALL FOR SUBMISSIONS FOR THE POSTER SESSION.** Three copies of a one page abstract of the research should be submitted to John Richardson. Guidelines basically follow those for the research abstracts.

Scorecard for Judging AIAEE Paper Proposals

Paper Number________

Please review each paper as to the criteria indicated, and assign a numerical score, up to the maximum indicated, for each component and add for the total score.

_____**(10 points) Clarity of purpose**

_____**(10 points) Methods and data sources; or theoretical/philosophical themes clearly articulated.**

_____**(20 points) Content: current, accurate, clear, well organized, original, main points articulated.**

_____**(10 points) Results and/or conclusions: Presented logically and clearly compatible with the paper theme.**

_____**(15 points) Educational importance**

_____**(25 points) Relevance to conference theme "Communication Technology: Linking the World"**

_____**(10 points) Followed prescribed format explained in the call for papers**

____**Total Score** **(Please add your assigned scores for each item)**

Reviewer Comments: ____
____

Reviewer Name:____

1997 AIAEE Conference Refereed Papers

Session A — COMMUNICATING TECHNOLOGY

Session Chair - David Acker
Jefferson Room

TITLE: Communicating Technology Among Farmers in West Africa: Rice Technology Diffusion Among Women Farmers in The Gambia
AUTHOR: Remileku Rakey Cole, Cornell University
DISCUSSANT: Jan Henderson

TITLE: The Identification of Communication Messages in the Promotion of Agricultural Development
AUTHOR: Gustav H. Duvel, University of Pretoria
DISCUSSANT: Jan Henderson

TITLE: Biodynamic Agriculture: A Paradigmatic Analysis
AUTHORS: Andrew Christopher Lorand, Agricultural Consultant
Arlen W. Etling, The Pennsylvania State University
DISCUSSANT: Jan Henderson

TITLE: Role of Communication in Promotion of Urban Agriculture and Protection of Environment: A Case Study in Southern Sri Lanka
AUTHOR: Dr. Kamal Karunadasa, University of Ruhuna, Sri Lanka
DISCUSSANT: Steve Jones

Session B **Extension Curricula**
Session Chair - Burton Swanson
Adams Room

TITLE: Responsively Reshaping Agricultural Extension Curricula In Universities and Colleges of Sub-Saharan Africa
AUTHORS: M.M. Zinnah, University of Cape Coast, Ghana
Roger E. Steele, Cornell University
D.M. Mattocks, Winrock International Institute for Agricultural Development
D. Naibakelao, Sasakawa Africa Association, Ghana
DISCUSSANT: Layle Lawrence

TITLE: The Birth of a Two Year Post Secondary Agricultural Technology Program at the American Farm School in Greece
AUTHOR: John R. Crunkilton, Virginia Polytechnic Institute and State University
DISCUSSANT: Layle Lawrence

TITLE: Means V. Ends: Communication Technology as a Lever To Advance Internationalization
AUTHOR: Betty L. Wells, Iowa State University
DISCUSSANT: Layle Lawrence

TITLE: Attitudes Affecting Peruvian Farmers' Choices: The Influence of Selected Factors
AUTHORS: David R. Dominguez, Arlen Etling
The Pennsylvania State University
DISCUSSANT: Rama Radhakrishna

Session C **Rural Development**
Session Chair - Dunstan Campbell
Kennedy Room

TITLE: China On the Road to Unsustainability: Agriculture and Natural Resources in the Northwest
AUTHOR: William M. Rivera, University of Maryland
DISCUSSANT: Larry Miller

TITLE: The Opinion of Women about a Rural Development Program in Northern Potosi, Bolivia
AUTHORS: Pilar Lopez, Solange Angel, Edward Ruddell
World Neighbors, Santiago, Chile
DISCUSSANT: Larry Miller

TITLE: Educational Change in China: Making the Market System Work
AUTHOR: Thomas H. Bruening, The Pennsylvania State University
DISCUSSANT: Arlen Etling

TITLE: Self-Perceived Professional Competencies Needed and Possessed by Agricultural Extension Agents in The Fars Province of Iran
AUTHORS: Mohammad Chizari, Tarbiat Modarres University
Ahmad Reza Pishbin, Tarbiat Modarres University
James R. Lindner, The Ohio State University
DISCUSSANT: Arlen Etling

Session D **Adoption of Innovations**
Session Chair - Latif Laghari
Roosevelt Room

TITLE: A Causal Analysis of the Impact of Information on Adoption of Farming Innovations and Yield: A Mauritian Case Study
AUTHOR: Christine de la Paz, University of Connecticut
DISCUSSANT: Satish Verma

TITLE: Extension Education: A Prime Mover in the Development of Agroforestry
AUTHOR: John Gowland Mwangi, Egerton University, Kenya
DISCUSSANT: Satish Verma

TITLE: Involvement of Kenyan Women in Household Decision-Making Regarding Agricultural Activities
AUTHORS: Florence Nyangara, Joan Thomson, Rama Radhakrishna, The Pennsylvania State University
DISCUSSANT: Satish Verma

TITLE: The Role of Communication Variables in the Adoption of Irrigation Technologies in Lebanon
AUTHOR: Teffera Betru, American University of Beirut
DISCUSSANT: Satish Verma

Session E Instructional Technology

Session Chair - Mary Lou Carlson

Lincoln Room

TITLE: Teachers' Perceptions and Uses of Instructional Technology in Selected Vocational Agriculture Schools in Lithuania

AUTHORS: James J. Connors, University of Idaho
James A. Brousseau, Milan High School, Milan, Michigan
DISCUSSANT: Frank Bobbitt

TITLE: A Survey of Farmers' Extension Communication Needs in Zambia

AUTHOR: Robert A. Agunga, The Ohio State University
DISCUSSANT: Frank Bobbitt

TITLE: Computer Use by the Teaching Staff in the Faculty of Agriculture, University of Swaziland

AUTHORS: M. M. A. Dube, Roger C. Kuhn
University of Swaziland
DISCUSSANT: Frank Bobbitt

TITLE: Linking Learners with Communication: What International Agricultural and Extension Educators Can Do

AUTHORS: Naana O. Nti, K. Dale Layfield, Rama B. Radhakrishna, The Pennsylvania State University
DISCUSSANT: William Thuemmel

Session F **Communications Technologies**
Session Chair - Layle Lawrence
Lincoln Room

TITLE: Communications Technology and Agricultural Extension in Pakistan
AUTHOR: Latif Lighari, University of Connecticut
DISCUSSANT: Rakey Cole

TITLE: Communication Channels Preferred by Rural and Urban Audiences for Conservation Information about La Primavera Forest, Mexico: Implications for Extension Services
AUTHORS: Ana Ramirez Carr, Eric Abbott
Iowa State University
DISCUSSANT: Rakey Cole

TITLE: Communication Technologies for International Agricultural and Extension Education: Challenges and Opportunities
AUTHORS: K. Dale Layfield, Naana O. Nti, Rama B. Radhakrishna, The Pennsylvania State University
DISCUSSANT: Arnold Parapi

TITLE: Extension Communication and Sustainable Agricultural Training Needs of the Innovative Farmers of Ohio
AUTHORS: Robert A. Agunga, Ana Lucia Kazan
The Ohio State University
DISCUSSANT: Arnold Parapi

Session G **International Education**
Session Chair - William Thuemmel
Roosevelt Room

TITLE: International Educational Needs of Iowa Agribusiness
AUTHORS: Joe Dale, David Acker, August Ralston, Steffen Schmidt, Mack Shelley
Iowa State University
DISCUSSANT: Mary Lou Carlson

TITLE: The Collegiate International Experience: Criteria For Success
AUTHORS: Julie Ann Tritz and Robert A. Martin
Iowa State University
DISCUSSANT: Bob Maxwell

TITLE: Perceptions of Leaders of the National Young Farmers Educational Association Regarding International Agriculture Implications for Agricultural and Extension Education
AUTHORS: Kamal A. Elbasher, Robert A. Martin
Iowa State University
DISCUSSANT: Bob Maxwell

TITLE: Recent Graduates Perceptions Regarding the Infusion of a Global Perspective into the Curriculum of Selected Land-Grant University Colleges of Agriculture
AUTHORS: Joe Dale, Robert Martin
Iowa State University
DISCUSSANT: Bob Maxwell

Session H **Extension Programming**
Session Chair - Roger Steele
Kennedy Room

TITLE: Testing Decision-Making Tools to Help Front-Line Agricultural Extension Staff Advise Ghanaian Farmers on Effective Maize Storage Options
AUTHORS: Rose Feakpi, Ministry of Food and Agriculture, Ghana Moses Zinnah, University of Cape Coast, Ghana ,Ivy Drafor, University of Cape Coast, Ghana Julia Compton, Nairobi, Kenya
DISCUSSANT: Don Meaders

TITLE: Andragogy Versus Pedagogy Revisited: Extension Risk Management Education in the Post-Pair Act Environment
AUTHOR: Henry Bahn, USDA - CSREES
DISCUSSANT: Bill Seiders

TITLE: A Case Study in Collaborative Consultation
AUTHOR: Arlen W. Etling, The Pennsylvania State University
DISCUSSANT: Don Meaders

TITLE: The Image of Michigan State University Extension As Perceived by County Advisory Committee Members and Extension Staff In Michigan
AUTHORS: Frank Bobbitt, Usman Adamu
Michigan State University
DISCUSSANT: Don Meaders

Session I **Extension Training**

Session Chair - Betty Wells

Adams Room

TITLE: Participatory Management Training Needs of Extension Personnel in Zambia

AUTHORS: Robert A. Agunga, Mary C. Kimball
The Ohio State University
DISCUSSANT: Gustav Duvel

TITLE: A Review of the Journal of International Agricultural and Extension Education

AUTHORS: Rama Radhakrishna
The Pennsylvania State University
Satish Verma, Louisiana State University
DISCUSSANT: Steve Jones

TITLE: Participatory Training Programs that Prepare Women to Enter the Mainstream of Extension

AUTHORS: Dorothy M. Wanyama, Kitale, Kenya
Roger E. Steele, Cornell University
DISCUSSANT: Steve Jones

TITLE: Inservice Training Needs in Appropriate Technology as Perceived by International Agricultural Development Workers

AUTHORS: Samuel C. Allen, University of the Philippines
Michael E. Newman, Mississippi State University
DISCUSSANT: Rama Radhakrishna

Session J **Technology Transfer**
Session Chair - Edward Ruddell
Jefferson Room

TITLE: Joint Focused Programming for Enhanced Information Delivery
AUTHOR: Dunstan A. Campbell, U.W.I Outreach Lecturer, St. Lucia
DISCUSSANT: William Rivera

TITLE: The Changing Role of Extension in Technology Transfer
AUTHOR: Burton E. Swanson, University Of Illinois at Urbana-Champaign
DISCUSSANT: William Rivera

TITLE: Determinants of Opinion Leader Effectiveness in Information Transfer
AUTHOR: Gustav H. Duvel, University of Pretoria
DISCUSSANT: William Rivera

TITLE: The Attitudes and Patterns of Farming in Trinidad
AUTHORS: Wayne G. Ganpat, University of the West Indies
Deokee Bholasingh, Ministry of Agriculture Land and Marine Resources, Trinidad
DISCUSSANT: Mary Lou Carlson

Session A COMMUNICATING TECHNOLOGY

Session Chair - David Acker
Jefferson Room

TITLE: Communicating Technology Among Farmers in West Africa: Rice Technology Diffusion Among Women Farmers in The Gambia
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AUTHOR: Dr. Kamal Karunadasa, University of Ruhuna, Sri Lanka
DISCUSSANT: Steve Jones

Communicating Technology Among Farmers in West Africa
Rice Technology Diffusion Among Women Farmers in The Gambia

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Cornell University
Ithaca NY, 14850

I. Introduction

The Gambia, one of the smallest countries in Africa, is facing severe economic problems and food shortages. Agriculture, the country's principal productive activity, is based on traditional systems of shifting cultivation and small independent farm units. Food production has not met local demand. The country is increasingly dependent on imports, primarily rice. Rice is the country's main staple and constitute a major component of food supply. Its imports have risen from 28,000 tons in 1974 to over 60,000 tons in 1989. 1995 figures show rice imports at 128,000 tons. If current trends continue at the population growth rate of 4.5% (Gambia - 1994 census), imports will have to be doubled in the next 7-10 years. Increasing rice production, thus, has become one of the Government's major priorities for development. The country's limited export base, modest foreign exchange earnings, and a subsequent lack of resources to import has made this an important priority. The increasing level of food consumption, coupled with limited economic resources, show a demonstrated need to reduce dependency on imports.

Several government sponsored attempts have been made since the late 1940's to increase the level of rice production. Projects implemented, however, have met with only limited success and production has not increased significantly. A notable shortfall in approaches made by the government so far during the project implementation process is that minimal consideration has been given to existing traditional farming practices and the social organization of production.

Rice is primarily grown by women in The Gambia, and has been termed by many as "a woman's crop" (Dey, 1980). Male farmers are traditionally engaged in the production of other coarse grains such as millet and sorghum. Diffusing rice technology through an inherently ineffective extension system have not helped the women to improve the already profound knowledge they have in the rice production sector. Frustration and disillusion emerged during interviews and focused group discussions with women rice farmers in the Gambia, with particular reference to proposed technology use, technology significance and access to resources such as credit, fertilizer and other attributes to technology packages. The cultural context with specific regards to the social organization of production is a major determinant of the direction that development takes in the rice production sector.

II. The Study

The study was done as a means of establishing the reasons for the limited success of rice schemes; specifically the factors constraining farmers' production during the project implementation process. The study focused on the Jahally Pacharr Irrigated rice scheme, one such government attempt, located on 24,000 hectares of swampland, south of the river Gambia. The study determined constraints to the project process as perceived by farmers themselves. Once factors had been clearly established, it became possible to formulate realistic measures to overcome them.

The study proposes strategies by which these constraints may be removed, and suggests how the removal of such constraints would contribute to increased rice production and productivity to ensure project success.

Irrigated rice production system has proven to be an effective means of increasing production. Past schemes emphasized a centralized irrigation system. However, in addition to the significant engineering works required, a centralized irrigation system has turned out to be costly to maintain both financially and culturally. The complete diversion from traditional systems has resulted in low farmer adaptability and subsequent abandonment of rice schemes. Critical to the success of any rice development scheme is a realistic understanding of the maintenance problems encountered by mechanical irrigation schemes. Experience from the implementation of a centralized system suggests the need to shift away from it.

This research looked at a specific rice technology, tidal irrigation technology which is currently underutilized but which appears to be a preferred technology for women farmers, and which seems to have considerable potential for improving swamp rice production. It has proven to be more efficient in terms of yield increase than either traditional rainfed, or the centralized irrigation system. It appears that improving existing technology would both preserve farmer control and yield increase. Evidence from past attempts show the need to identify a means of lowering cost of production while improving efficiency. This study shows that tidal irrigation has the potential to succeed under existing ecological and social conditions in The Gambia.

To emphasize conditions for a successful tidal irrigation scheme, this research presents a pilot study, based on existing practices by the women, of specific acreage, input costs, and output in terms of yield. Analysis from the study concluded that with sufficient enhancement, tidal irrigation can be independently implemented by the local farmers to significantly increase production. The potential for increasing rice yield thus, is evident.

To resolve the food shortage problem in The Gambia, therefore, and maintain a sustainable rice system, my specific recommendation was to integrate traditional farming practices with new forms of farming methods, with a view to the social organization of labor, improve management and technical efficiencies in order that available swamps and river resources be effectively utilized.

III. Purpose of Paper

The purpose of this paper is to identify ways in which international agriculture and extension educators portray development and to examine the implications of their understanding on identifying/selecting technology programs for rural women farmers. The paper also examines the extent to which educators consider local knowledge and the implications of this on technology communication process.

Focus is on efforts that has been attempted to communicate rice technology to women farmers, and how that has affected productivity and the availability of rice to the Gambian population. Emphasis is on linkages between technology development and technology diffusion.

The paper aims to promote the use of communication technology such as video, satellite telecommunication systems (distance education process) to demonstrate the use of proposed rice technology, and to communicate success stories of rice technology that are being practiced around the world. Women in The Gambia, due to past scheme failures, have had little faith in the types of technology proposed to them. Because of their lack of faith, they have either paid little attention to the details of schemes introduced to them, or they have accepted them with minimal consideration. As a result, they have, to date, not hesitated to abandon proposed schemes at the slightest mishap to revert to their old schemes.

Scheme malfunction has major implications: the attitude of farmers could thus be attributed to economic condition of the farm family. Because farm families have to sustain from local production, with limited or no alternative sources of income, farm families cannot afford the risks or the social and economic costs of scheme failures. "Farmers are at higher risk than donors because they pledge their scarce resources to build up irrigation systems, for them, literally a matter of life and death" (Webb, 1982).

Demonstration of potential success and provision of communication technology that links farmers to the rest of the world would help create/restore faith for new innovative technology among farmers, and create a more sustainable environment for technology diffusion and practice.

Finally, the paper examines the gaps that exists between research and practice; between perceived needs and the actual needs of farmers; between farmers and extension workers; and propose linkages through communication and participation.

The following research questions will guide this paper:

- How do educators in international extension education view development?
- What does formal discourse in international agricultural extension tell us about including local knowledge?
- As educators and as practitioners , when do our ideals converge with realities and what are the implications of this "new reality?"
- Can technology be the solution to The Gambia's rice problems?

IV. Methodology

Data for this study was collected from The Gambia, Senegal and Cote D'Ivoire on a research trip in summer of 1993.

1. Primary Data Sources:

I worked with several populations, mainly through interviews and focused group discussions.

a. A sample of women from the population of women involved with the Jahally Pacharr Rice project in Seruja, McCarthy Island Division;

b. A random group of male farmers, partners and relatives of the women rice growers (men mainly grow peanuts and coarse grains);

c. Project managers and counterpart project developers of the Jahally Pacharr project;

d. Critics of the Jahally Pacharr Project -- independent researchers, consultants;

e. A sample of personnel from the Ministry of Agriculture;
  - -personnel from the Department of Agricultural Research
  - -personnel from the Sapu Agricultural Station
  - -Extension workers

The central issue was how each group perceived the Jahally Pacharr project; how each group viewed farmers' position; why farmers were frustrated; how could the situation be improved.

2. Secondary sources:

a. Information and literature was obtained from the Ministry of Agriculture, the Department of Agricultural Research, the Department of Planning, and the Department of Statistics in The Gambia.

b. Research and consultancies done by:

- International Fund for Agricultural Development (IFAD),
- Food and Agricultural Organization of the United Nations (FAO),
- United Nations Development Program (UNDP).
- West African Rice Development Association (WARDA).

3. Observations:

Visits were made with research projects (demonstration plots) in WARDA, Cote d'Ivoire and MID, The Gambia.

4. Analysis

A feasibility/scenario analysis was conducted using production costs and returns data from the various rice systems operating in the country. The profitability of each was estimated at the project level. A scenario analysis was carried out based on costs and returns of production per technology versus imports. Cost per metric ton of rice imported was compared to cost per ton produced. An impact analysis was done based on projected increase in yield from increased inputs and projected increase in area.

Analysis of the problem was based on:

- constraints encountered by farmers in the Jahally Pacharr project process, specifically disincentives identified;
- a history of past initiatives to show that previous investment endeavors on the same and surrounding swamps have proven unsustainable;
- feasibility of producing, as opposed to importing rice, based on actual costs and returns data from the Jahally Pacharr project.

V. Jahally Pacharr Scheme - History and Technology Communication Process

The Jahally Pacharr irrigated rice scheme was initiated in 1980, as a new approach, to increase production and productivity of farmers. The goal was to improve rice self-sufficiency, and improve rural welfare, specifically to eliminate the "hungry season", when subsistence farming households have exhausted both their stored grains and their financial resources to purchase imported rice. It was anticipated that the potentially productive swamps would allow an estimated production of 5 to 7 tons per hectare, an increase from the 1.5 to 2.5 tons per hectare using traditional systems of production. The project was to serve as a prototype for future development of irrigation schemes. The goal was to achieve double cropping, supplying surpluses to local markets.

Three independent schemes were implemented:

-full water control using a centralized pumping system;
-partial water control using small pump irrigation system
-traditional irrigation using tidal flows from the river as well as rainfall.

Technology was diffused through the government extension system. Extension workers with irrigation experts worked with households with highly subsidized inputs to ensure the success of the process.

Problems Frustrating the Full Development of the Project

In addition to the technical and labor constraints[1] that the project faced, the study found the following major hindrance to its success:

i. Social Organization of Production

Appraisal, prior to the implementation of the project did not:

- consider adequately the social setting of the farming household;
- incorporate the existing practices of the farmers.

This is with specific reference to the traditional land tenure system, especially its impact on women during land reclamation processes, and the gender division of labor in rice cultivation. Women's traditionally allocated plots *(kamanyango)* were reclaimed for project purposes, and in addition, woman were largely excluded from improved rice technology packages. This created tensions in resource allocation under project induced conditions. Women not only withdrew their labor resource, but men, to whom the new technology and credit resources had been allocated, did not devote sufficient time to the implementation process. Consequently, the projects' main goals were not met.

ii. Conflict of Objectives : State vs. Farmer

A gap existed between the project planners and the project participants in terms of their ideas about the role of the project in the local economy[2]. The government's main objective was to achieve national food security and to reduce imports, farmers were expected to sell most of their harvest in the open market. Farmers, on the other hand, were more concerned with household food security. They decided that irrigated rice was too unpredictable, and they instead gave priority to it as a consumption crop rather than as a market crop. Thus a conflict in objectives made it difficult to sustain the project.

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[1] technical constraints were largely due to inappropriate irrigation design, a highly mechanized irrigation system that neither extension nor farmers could understand or operate effectively; working in their tradition al farms which had much less mechanical demands was labor intensive much less the highly sophisticated centralized system introduced to them.

[2] Webb indicated that one of "the key lessons that has been learned about planning irrigation was that it was vital to identify the roles that irrigation and rainfed agriculture were intended to play in food production and in national development" (FAO 1984, Webb 1991).

iii. Institutional Arrangement for Farmer Participation

Lack of farmer participation in the project planning process was a major deterrant to project success. Because farmers were not involved in the planning process, they had an agenda that was separate from the general goals of the project. This created a definite conflict in objectives between the two sectors; the government and the farmer, and resulted in a situation whereby the national objective of rice self-sufficiency was never realized. Farmers, for one, had succeeded in eliminating the "hungry season" and earning a little income by selling rice at higher prices across the border in Senegal. However, it rendered them incapable of repaying their loans, and the government had to apply strict rules which affected the project.

iv. Project Implementation and Management

Lack of communication between government extension workers and farmers caused several problems. First, insufficiently informed, farmers were left to use fertilizers and other inputs as they thought appropriate. This resulted in inappropriate timing and application of inputs, which impacted yields negatively. Second, farmers were not trained to operate irrigation machinery. This resulted in inappropriate use of pumps and other machinery by untrained farmers. These, among other constraints contributed to the reduced yields.

VI. Lessons Learned

i. Implications for Development in Extension Education

Three issues emerged from this study that has specific implications for extension education:

a. The underlying assumptions of educators and practitioners in their endeavor to improve farming systems in rural communities;
b. assumptions suggests the educators and practitioners have ideals which do not often converge with the realities in the field;
c. assumptions leave little room for incorporating local knowledge in the design and diffusion of new technology.

In the context of the Jahally Pacharr Project, the "educators" are the planners and project developers, who set themselves to "educate" farmers about new ways of improving their productivity. Their view of development is portrayed through their mode of technology design and diffusion. They come into the process with underlying assumptions of being able to determine what farmers need and aim to help farmers achieve those needs through direct technology transfer via a weak extension system. It turned out that extension personnel comprehend prescribed technology little more than the farmers. In the case example of the Jahally Pacharr project, "educators" identified, selected and designed technology on the assumptions that:

1. the irrigation systems designed was appropriate for farmers in the Gambia;

2. the mode of diffusion and the organization for the implementation of project --a centralized management system -- was efficient;

3. labor resources, women's labor, would accommodate the system.

The outcome of the project implied that educators and practitioners came into the field with ideals that had little relevance to the realities in the field. This was apparent through the three shortfall that surfaced in the implementation process: namely the lack of social infrastructure to accommodate indigenous systems; the lack of institutional infrastructure for farmer participation that led to the mismatch between farmer objectives and government objectives, and the centralized mode of project management with limited or no feedback or communication scope, had high costs for the overall project process.

Interviews with groups of project developers as well as groups of farmers revealed that each had limited regard for the others strategies. Farmers, due to the many failures of rice projects in the past, had lost faith in new strategies. development practitioners, on the other hand, faced "new reality". While they became aware of shortfalls and endeavored to work with farmers, they felt limited in that they could work with farmers only through the extension system, which in itself had its limitations. A significant lesson for extension education is that a strong extension infrastructure, and farmer participation in the planning process with specific regard for local knowledge are the first steps to major development interventions such as that of the Jahally Pacharr project. The Gambia needs trained extension personnel. Inadequately trained extension staff could not "diffuse" technology effectively and so could not get farmers to experience the real gains of the technology. Productivity was not really affected.

ii. Scenario Analysis -- Technology as The Gambia's Solution

The study identified that the first step to increasing self sufficiency in rice was to put the abundant swamps into effective use through less labor intensive means; and next, to increase yields by modifying existing traditional cropping practices to incorporate new strategies. Under the circumstances of lack of rain, irrigation appears to be the best solution to the country's agricultural problems. However, the issue is dependent also, on the technology design. Irrigation comes with high costs for both investors and participants. Farmers are at higher risk than donors because they pledge their scarce resources to build up irrigation systems, for them, literally a matter of life and death (Webb, 1982).

If technology is the solution to The Gambia's rice problems as apparent from this study, it is necessary to examine the profitability of such technology. The fact that farmers have readily abandoned schemes to continue with their old systems demonstrate this need. It was important to determine, therefore, that while it was crucial to increase the production of rice, it was also necessary to produce at costs competitive with rice imports. An analysis of costs per technology was done showing a comparison between the two types of irrigation technology used by farmers, full water control using centralized system, and traditional irrigation using tidal flows from the river.

The analysis indicated that although yields were high at 6.96 tons per hectare under the centralized irrigation system, cost of production per hectare was significantly higher at almost D40,000[3], compared to the traditional system of irrigation which yielded 1.54 tons per hectare, and costs almost D5,500[4] per hectare. In terms of cost of locally produced rice per metric ton, even at considerably lower yields than the centralized system, cost per metric ton of the tidal rice was considerably lower at D3,548 than the centralized system at D5,849 per metric ton. When these costs of locally produced rice per metric ton are compared to the cost per metric ton of imported rice, at D42,000, it is relatively cheaper to import rice than to produce at production costs based on the centralized irrigation system. On the other hand, even at yields as low as 1.54 tons per hectare, with very limited input, it is cheaper to produce rice under traditional methods than to import.

A what-if analysis conducted to determine the impact of yield increase (from increase input by 20%) showed a reduction on cost of rice produced per metric ton by more than 50%. The analysis showed that subsequent increased acreage and crop intensification would significantly change The Gambia's rice scene. If all potential swampland is utilized, 30,000 total annual yield at existing production levels would be 46,000 metric tons (at 1.54 tons per hectare). If yields were increased to 5.5 tons per hectare, 165,000 metric tons would be produced. Thus, in order to do away with current levels of imports, the country needs to utilize all 30,000 hectares of land area and increase yields for swamp rice production to 5.5 tons per hectare.

With yields at 5.5 tons per hectare, cost per metric ton of domestically produced rice become significantly lower (from D3, 548 to D1,173). At such low production costs, import levels could be significantly reduced if not totally done away with.

A scenario analysis done in this study suggests that tidal irrigation may be an efficient means of increasing production. The maximum potential area in irrigated rice development may be achieved with an irrigation project designed to complement the existing practices of the people involved (Jones 1989).

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[3] Actual costs as shown in table 4 = D39,130

[4] Actual costs as shown in table 4 = D5,464

VII. Findings/Recommendations:

Critical to the success of any rice development program in The Gambia, or elsewhere in Africa, is a realistic understanding of the development context and existing strategies of rice-based knowledge. Identifying project constraints and proposing strategies to remove them is the first step to reaching farmers and creating an environment for developing and diffusing rice technology.

It is crucial that one understand the social organization of production among rice farmers; the practicality and suitability of programs depends on their adaptability to farmers' existing practices.

The most important laborers in rice production in The Gambia are women, the traditional rice producers. In the short run at least, it is necessary to recognize this role and give women the opportunity to participate fully in the appraisal, preparation, and implementation of rice development programs.

Past projects have introduced both farmers and extension workers to alien techniques of rice cultivation with no formal training before or during the implementation of those projects. This oversight has resulted in the termination of projects shortly after the departure of expatriate technicians. An improved training program is therefore recommended to avoid such shortfalls.

Government strategies need to emphasize training, information exchange or communication, getting farmers to understand the objectives of schemes, reasons for subsidies, and what is expected of them in return, but also to listen to farmers and use their knowledge and expertise (i.e., planning from the bottom up).

This study presents strong evidence that tidal irrigation has the potential to succeed under existing conditions in The Gambia. An analysis of costs versus returns of schemes implemented showed tidal irrigation system to be the most efficient under the circumstances.

From this analysis, it can be concluded that domestic production under swamp, tidal irrigation technology is a more appropriate means of increasing rice production in the swamps. The system is not only cost effective, it is very adaptable to farmers. Farmers have a working knowledge of using the tides though rudimentary methods have been used to date.

Finally, it is recommended that effective means of communicating technology be adapted to the technology diffusion process. As a means of giving farmers a view of related production activities around the world,
I showed, during my fieldwork, videos, pictures, and on-screen displays of rice production systems, particularly tidal irrigation, conducted in other parts of the world to village centers and community groups. From their expressions and reactions, I gathered that learning by doing is essential in

farm communities, but also that learning by seeing it happen elsewhere is an effective means of restoring the faith of farmers such as those in The Gambia who have completely lost faith in new technology. This study recommends the use of videos and distance learning techniques to help restore farmers' faith in new designs.

VIII. Educational Importance:

As educators and practitioners, we have ideals which we often perceive to be the realities in the context we work in. The study proved that this is not always the case. Its consequences include miscommunication and 'escalating error' (Argyris 1996). Argyris argues that all human action is a consequence of design, that ineffective action is as much a consequence of design as is effective action. The educational significance of this paper is that it implies a need to question and change our governing conditions. The double loop learning process described by Argyris (1982) is what I call the "new reality" resulting from lessons learned from past errors. We must use these lessons to improve the design and delivery of service in the agricultural sector.

The findings of this study will provide greater insights to program developers as well as program implementers, specifically, those who develop technology and those who diffuse them. It will provide them with a basis for the implementation of future intervention initiatives in terms of where to begin. The constraints that emerged from the Jahally Pacharr Project suggests starting from the bottom and moving up in the project development process.

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THE IDENTIFICATION OF COMMUNICATION MESSAGES IN THE PROMOTION OF AGRICULTURAL DEVELOPMENT

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Introduction

Purposeful communication is the essence of development intervention and thus also of agricultural extension. It is through purposeful communication that the management or adoption behavior of land users can be influenced in the quest of improving efficiency, be it of a production, conservation or economic nature.. The recent paradigm shift towards a more participative and facilitative approach has resulted in a shift in emphasis, but in numerous situations (e.g. resource conservation, sustainable production) purposeful communication remains an important challenge.

In communication the message credibility is of particular importance and it is assumed that the content of the message, more than anything else, is critical for success. In order to be effective, the message should be compatible with the needs of the receiver (Thompson, 1957; Baird, 1971; Wenburg & Wilmot, 1973). This paper proposes a *modus procedurus* of identifying the relevant needs and perceptions of the target audience, which then form the basis for message identification and development of the communication plan or program.

The Model

A model for behaviour analysis and intervention has to, in order to be acceptable, make provision for the fact that behaviour is a function of an extensive number of dynamically interdependent personal and environmental factors which, depending on the situation, can potentially become functional in various combinations and directions. To overcome the practical problem of having to deal with a unmanageable number of potentially important variables (Rogers 1983), a solution is sought in focusing on intervening variables through which most behaviour determinants become manifested in decision-making (adoption behaviour), and which can be associated with Lewin's (1951) field forces as direct causes of behaviour.

The model, illustrated in Fig. 1, is based on the Field theory (Lewin, 1951) and Tolman's theory (1961) and provides a conceptualization framework for the systematic pursuit of the causes of poor efficiency and poor or non-adoption of recommended practices or innovations. The hypothesized causes are of an "intervening" nature (Tolman, 1961), in the sense that they are the direct determinants of behavior. These causes are, according to evidence

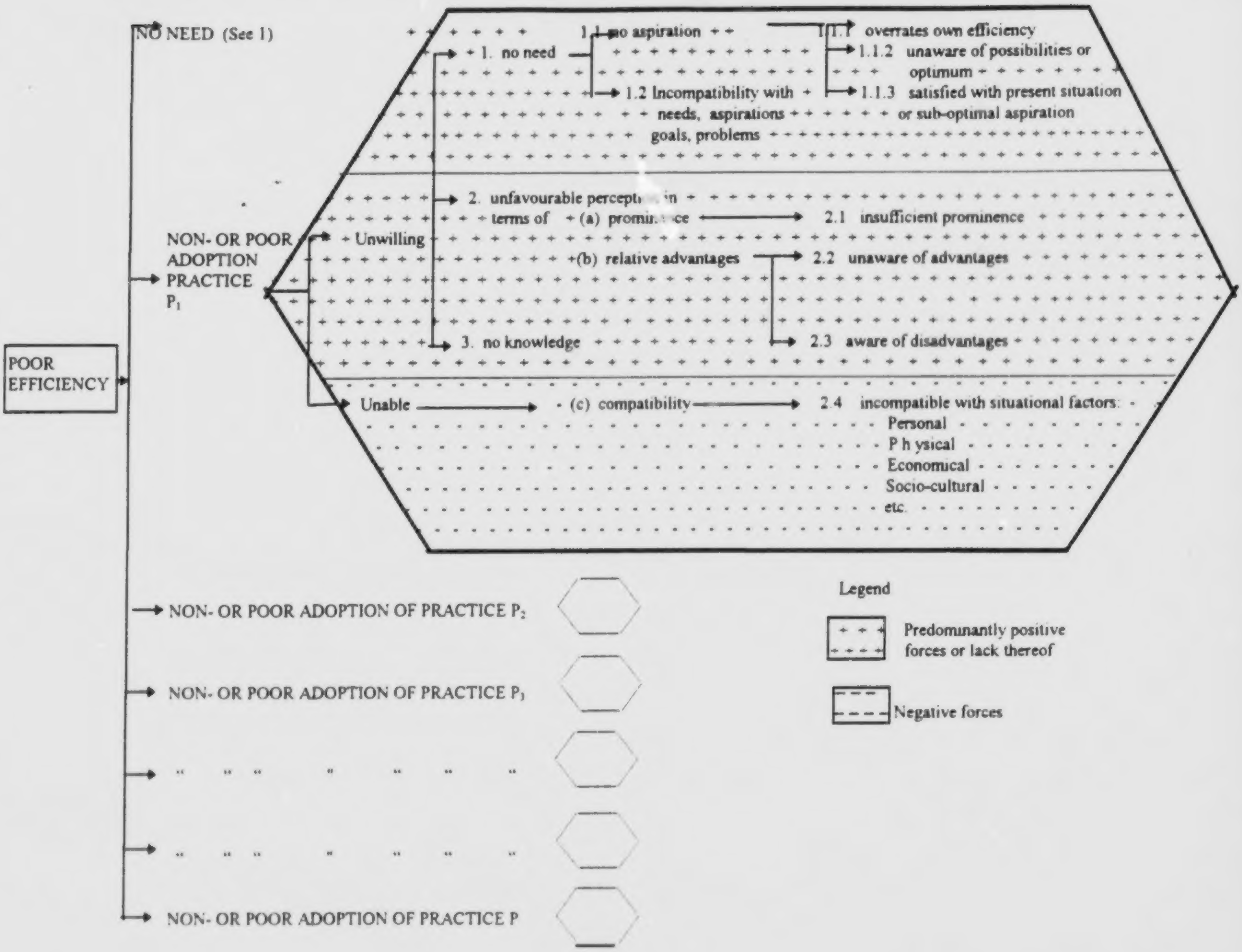
NO NEED (See 1)
1.1 no aspiration
1.1.1 overrates own efficiency
1. no need
1.1.2 unaware of possibilities or optimum
1.2 Incompatibility with needs, aspirations goals, problems
1.1.3 satisfied with present situation or sub-optimal aspiration
2. unfavourable perception in terms of
(a) prominence
2.1 insufficient prominence
NON- OR POOR ADOPTION PRACTICE P1
Unwilling
(b) relative advantages
2.2 unaware of advantages
3. no knowledge
2.3 aware of disadvantages
POOR EFFICIENCY
Unable
(c) compatibility
2.4 incompatible with situational factors:
Personal
Physical
Economical
Socio-cultural
etc.
NON- OR POOR ADOPTION OF PRACTICE P2
NON- OR POOR ADOPTION OF PRACTICE P3
NON- OR POOR ADOPTION OF PRACTICE P
Legend
Predominantly positive forces or lack thereof
Negative forces

Figure 1. Model for behavior analysis and intervention

provided by extensive research (Düvel, 1975; De Klerk & Düvel, 1982; Düvel & Scholtz, 1986; Düvel, 1991, Düvel & Afful, 1995), all need, perception or knowledge related, and will henceforth be discussed more specifically

Behavior determinants

(1) Needs

The concept of needs is used in a broad context and includes concepts like drives, motives, incentives, goals and even problems, mainly because the vocabulary of the psychology of motivation has as yet not been firmly established, resulting in these different concepts being used synonymously

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or being interchanged (Düvel, 1991). There appears to exist a "field polarity" consisting of a need (usually some form of deprivation resulting in disequilibrium or system in tension) located within the individual, and a goal-object situated in the environment. The goal-object will assume a positive character (positive incentive) if it is perceived by the individual as having a potential need-satisfying capacity, and a negative valency in the case of a threatening further deprivation (negative incentive).

The need-related causes that have been found to determine the non-adoption of recommended practices are lacking aspirations (see 1.1 in Figure 1) and need incompatibility (see 1.2 in Figure 1). The lacking aspiration relates more specifically to a tendency on the part of the farmer to overrate his own efficiency, e.g. his grazing condition or production efficiency (1.1.1 in Figure 1), to an unawareness of the possibilities or the optimum (1.1.2), and to a satisfaction with the present situation or having a sub-optimal aspiration (1.1.3).

In a sense these aspects all have to do with the problem perception where a problem is regarded as being the difference between "what is" (present situation) and "what can be" or is strived at (desired situation). If the existing situation, e.g. the efficiency of production or rangeland condition, is overrated due to "misperception" (see 1.1.1 in Figure 1), the perceived scope of the problem or potential need tension is reduced. If, at the same time, there is limited knowledge concerning the optimum that is achievable (1.1.2), the potential problem and need can be further reduced to an insignificant level.

Perhaps even more critical is the need compatibility (see 1.2 in Figure 1). This essentially means that an innovation or recommended practice does not fit the life space or need situation of the individual in the sense that it is not perceived as either a need related goal, or as a means of achieving such a goal.

The above has, from a message formulation point of view, the following challenges:

1. *To disillusion the client concerning his/her own efficiency*.(See 1.1.1 in Fig.1) This implies making him/her realise - of coarse in a diplomatic or sensitive manner and without public exposure - that the own eficiency is not on the high level he/she thought it to be. This disillusionment is particularly important in the case of the less efficient clients, because, according to empirical research findings summarised in Fig. 2, they are more likely to overrate their efficiency.

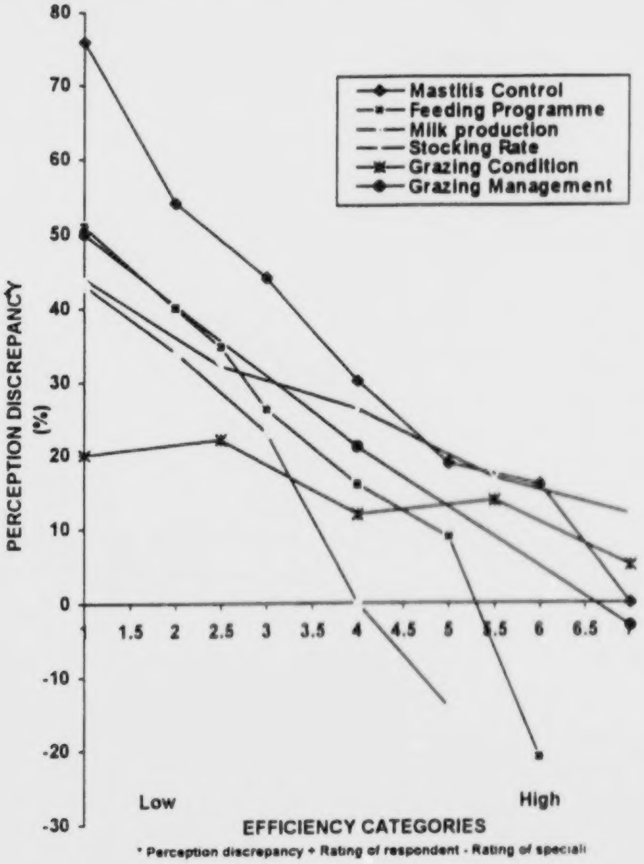

Figure 2. The average perception discrepancy between specialists and respondents concerning the efficiency of respondents (Düvel, 1994)

The effect of this disillusionment is to increase the potential need tension for increased efficiency or improved conservation farming or whatever the issue may be.

2. *To outline to the client the possibilities or the attainable optimum situation.* (See 1.1.2 in Fig. 1) This usually implies information about the optimum situation in terms of efficiency or practice adoption. The effect of it is similar to the already mentioned disillusionment concerning the current situation, in the sense that its effect is also one of increasing the potential need tension and consequently increasing the likelihood of behavior change.

3. *To increase the perceived compatibility between the farmer's needs and the recommended practice. (See 1.2 in Fig. 1)*

This is usually the most critical aspect from a behavior intervention point of view. Change can only occur if there is a perceived compatibility between the recommended innovation or practice and the individual's needs. The challenge from a behavior intervention point of view is therefore to clarify this compatibility.

(2) Perceptions

Although perceptions and needs (especially aspirations and goals) are related and interwoven, the necessity to identify all direct behaviour determinants as specifically as possible, justifies a separate focus on perception. Where needs usually relate to all positive or driving forces which in total constitute the attractiveness, perceptions are of a more specific nature and are analyzed on the basis of attributes of innovations. Roger's (1983) classification of innovation attributes does not suit this purpose, mainly because of the broad and unspecific categories. In order to make provision for a wider spectrum of specific forces (for the purpose of cause identification as well as for addressing these causes in the attempt to promote change), these attributes have been redefined (Düvel, 1987). The categories that can be directly associated with field forces are relative advantages, compatibility aspects and prominence and consequently give direct access to the possible identification of relevant positive and negative forces.

An unfavourable perception as cause of unwillingness to adopt can thus have the following causes:

(a) Insufficient prominence (2.1 Fig. 1)

The already mentioned necessity to specify the causes as specifically as possible led to an alteration of the concept 'relative advantage' (Rogers, 1983) to 'relative advantages', in order to make provision for the more specific advantages and disadvantages such as economical, social, managerial, and the like. However, research findings by Düvel & Scholtz (1992) revealed that innovations may be perceived positively without being adopted, simply because another alternative is preferred or perceived even more positively (i.e. more prominent). This emphasized the necessity for a global comparison between alternatives as implied in Rogers' (1983) concept of "relative advantage". However, because of the potential confusion between "relative advantage" and "relative advantages", it was decided to rather refer to the former as "prominence". Prominence is, therefore, very similar to or even synonymous with Rogers' (1983) concept of "relative advantage" and is a measure of how prominent of how more or less advantageous or attractive the innovation as a whole is relative to other alternatives

A typical example of the importance of this aspect of perception comes from the findings of the Düvel & Scholtz (1992) study, where the large majority of respondents had a favourable perception of the recommended innovation (grazing system). Ultimately, however, only 38 percent preferred it to other alternatives, revealing a highly significant correlation ($r^2 = -0.316$; $p = 0.005$) between perceived prominence and practice adoption.

From a message formulation point of view the challenge is the following, viz.

4. *To increase the relative attractiveness of the recommended practice as opposed to other more favoured alternatives.* The alternatives solutions can vary considerably, but in the majority of cases refer to the one currently adopted.

(b) Relative advantages (see 2 (b) in Fig.1)

An unfavourable perception concerning the relative advantages refers to both advantages as well as disadvantages of the innovation or practice. The possible causes of non-adoption could thus be

- unawareness of the advantages (2.2 Fig. 1) and/or
- awareness of disadvantages (2.3 Fig.1).

Both advantages and disadvantages are need-related in the sense that both contribute to the overall attractiveness (or unattractiveness) which can come about only in the context of a relevant need disposition. Innovation attributes such as advantages and disadvantages in a certain need context can constitute positive (driving) and negative (change impeding) forces. The imbalance of negative over positive forces as cause of non-adoption would then be the result of the unawareness of advantages or an awareness of disadvantages. This would imply that insufficient knowledge is not a negative force, but rather an absent positive force. In practice this differentiation is not critical. Important is that the various forces, whether positive or negative, are identified and systematically addressed in extension programmes. Appropriate messages in this regard should consequently be aimed at the following:

5. *To convey knowledge or information to the target audience about the advantages of the recommended solution.*

6. *To reduce clients concern about the disadvantages of the recommended solution*

(c) Incompatibility (2.4 Fig. 1)

Where advantages and disadvantages refer to an innovation or goal-object as such, compatibility relates more to situational aspects i.e. the perceived relevancy of the innovation in the individual's specific situation. Compatibility or incompatibility is again no unidimensional factor but can refer to a wide range of aspects e.g. personal, physical, economical, social, cultural, etc.

This category of behaviour determinants does not include compatibility of needs for which separate provision has been made in item 1.2 (Fig. 1). The reasoning behind this is that need compatibility represents the basic positive forces, whereas the other compatibility aspects largely represent constraints en route to the goal. The latter consequently represent potential negative forces which, once overcome and once adoption has occurred, are not relevant anymore. By implication this means that the compatibility aspects are potentially only negative forces. They can be overcome or neutralized but do not constitute positive or driving forces. In other words these aspects, if incompatible, cannot bring about change. On the other hand the negative forces associated with disadvantages are inherent attributes of the innovation and consequently continue to exist even after adoption. Viewed in this light, most of the factors preventing adoption (see incapability, Fig. 1) fall into this category.

The challenge from a behavior intervention point of view is

7. *To reduce the receivers' concern about the perceived constraints or hindrances preventing the implementation of a recommended solution.* Where these problems are real obstacles rather than only perceived problems, change can often be affected by facilitating change in the environment. For example, the late availability of credit could be a major constraint to earlier planting. In that case the most effective way of changing behavior would be to see to it that delays in the issuing of loans are ironed out.

(3) Knowledge (3, Fig. 1)

Knowledge that is relevant in the case of innovation or practice adoption can be categorized as follows:

(i) Basic knowledge or knowledge of principles

(ii) Knowledge associated with the awareness of relative advantages and knowledge of the recommended solutions

(iii) Knowledge in respect of the application of an innovation or practice

The first two types of knowledge in particular are related to each other, but from a motivation point of view it is really only the knowledge concerning the recommended solution and its relative advantages (ii), that is of importance. This type of knowledge or cognition can be regarded as an intrinsic part of perception and thus largely overlaps with it. It is for this reason that an analysis of perception also caters for most relevant aspects of knowledge.

The knowledge of principles (i) is important because it provides insight and therefore invariably has a bearing on the intensity with which the relative advantages (ii) are perceived as field forces. Basic knowledge is also fundamental if the farmer is to become independent or self-sufficient in terms of decision-making and self-help.

Practical knowledge (iii) is one of the last pre-requisites for implementation or, in terms of Lewin's (1951) model, one of the last areas through which it is necessary to move before goal achievement. This aspect is thus largely provided for under compatibility (2.4) and thereby supports the conclusion that, through an analysis of perception, most relevant aspects of knowledge can be identified.

The force field

The model in Figure 1 is a hypothetical construct providing an inventory of potential causes of the non-adoption of a practice or innovation. It lends itself for planning research into adoption behavior or, more commonly, for planning situation surveys prior to the planning and launching of development programs.

The procedure entails an initial brief definition of the problem (e.g. lacking efficiency or poor practice adoption) followed by its conceptualization using the model framework (Figure 1). The hypothetical causes provide the basis for the questionnaire construction and the survey will ultimately show which of the hypothetical causes are in fact causes and to what degree.

Figure 3 is a summary of the results of a typical problem analyzed with the aid of this model. The figure represents the constellation of forces identified in the case of the problem of over-stocking (or the non-adoption of the recommended stocking rate) of natural rangelands. In this case the length of vectors or forces is a reflection of the number of target audience members to whom the various positive and negative forces pertain. The large-scale non-adoption of recommended stocking rates is explained by the imbalance of negative over positive forces. These forces also form the basis for an intervention program, in the sense that they provide the basis for the identification of appropriate communication

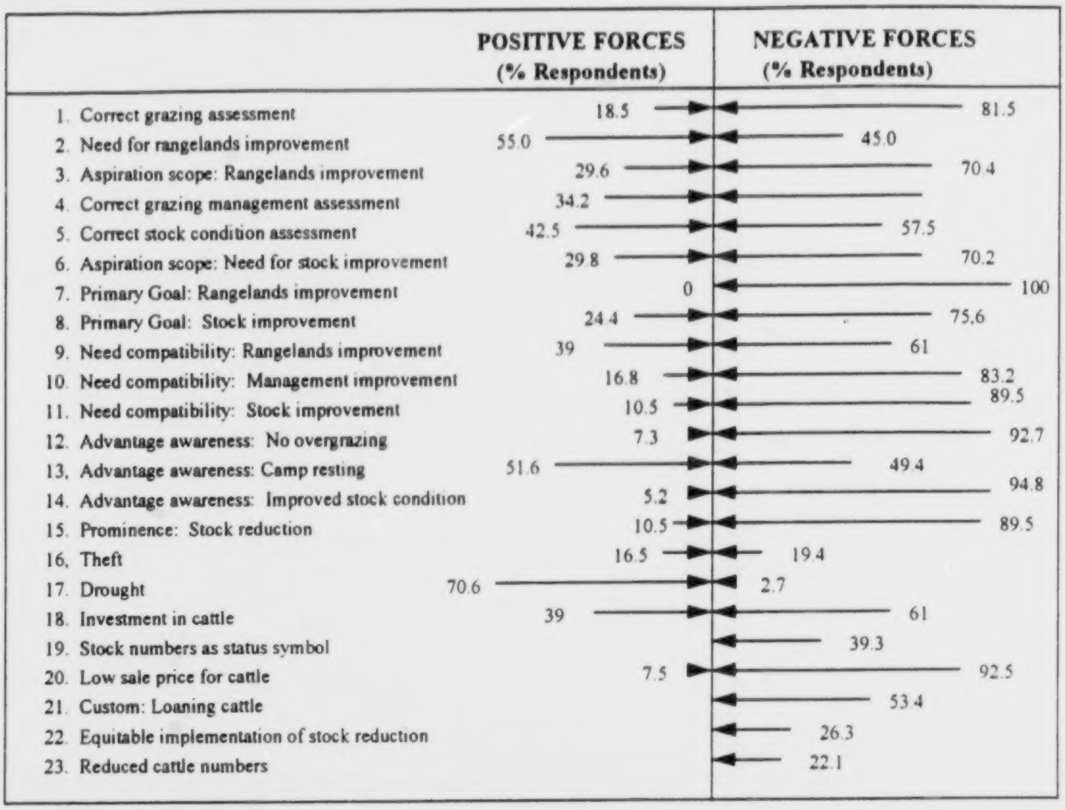

Figure 3. An overwiew of positive and negative forces pertaining to stock reduction (Düvel, 1995)

messages aimed at the systematic strengthening of positive forces or the weakening or elimination of negative forces.

Conclusion

The suggested model based on Lewin's and Tolman's theories tries to focus on the intervening or mediating variables assumed to represent the *forces* directly responsible for adoption behavior. As such it provides a useful method for identifying messages appropriate for the systematic promotion of change programs and lends itself for designing and constructing the complete communication program.

It is a departure from many traditional approaches which tend to emphasize the extension methods rather than the message content in development programmes. Although the evidence provided suggests that this approach has promising possibilities for analysis and intervention purposes, it needs to be further developed and refined. It still has to be ascertained whether additional intervening variables have to be included and how these can be reliably measured. In designing and refining reliable measuring techniques and devices, attention will have to be given to the valence and the

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probability aspects. However, in its present state, the model already serves a very useful framework in evaluation studies, behavior research and programmed extension or development.

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Biodynamic Agriculture: A Paradigmatic Analysis

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Biodynamics is the oldest organized alternative agricultural movement in the world. From the beginning, biodynamics has been an approach that addresses the biological, technical, economic, and social aspects of farming and gardening. The biodynamic movement has developed methods of organizing farms and methods of plant and animal husbandry; it also revived elements of traditional approaches that have proved to be sound. Beginning in 1928, the biodynamic movement pioneered the marketing of certified food; this innovation has since been taken up by many other groups (Koepf, 1989, p. 17).

Although biodynamic agriculture is the world's oldest alternative agricultural movement, it is not well known in the United States. It is referenced in the USDA's annotated bibliography Tracing the Evolution of Organic/Sustainable Agriculture (Gates, 1988). When the authors have mentioned biodynamic agriculture in conversations with extension agents and teachers of agriculture around the United States, most have not heard of it. With the passage of the 1990 Farm Bill which includes the regulation and certification of organic produce, however, more agents and teachers can expect questions about this world-wide movement. Primary sources on biodynamic agriculture are not easy to find. Furthermore these books use language and describe concepts that are outside most agricultural educators' frames of reference. The problem is to describe biodynamic agriculture in terms that are accessible to extension agents and teachers of agriculture.

Purpose

The purpose of this doctoral thesis was to provide a basic foundation for practitioners and professionals to develop a comprehensive framework and understanding of the paradigm for biodynamic agriculture. The specific objectives were to describe 1) the beliefs about the nature of reality with regard to agriculture (ontological beliefs); 2) the beliefs about the nature of the relationship between the practitioners and agriculture (epistemological beliefs); and 3) the beliefs about how the biodynamic practitioner should go about working with agriculture (methodological beliefs).

Method

The need for a systematic, explicit presentation of the essential principles underlying a set of agricultural practices was articulated. The elements of such a presentation need to reflect the rigors and standards of systems thinking. Such an analysis of biodynamic agriculture was accomplished using Guba's (1990) model. Guba maintains that paradigms (the set of beliefs that guide action, whether they are everyday actions or action taken in connection with a disciplined inquiry) can be best analyzed by answering three specific questions: 1) what is the nature of reality (ontology); 2) what is the nature of the relationship between the knower and that reality (epistemology); and 3) how should the knower (the practitioner) use that knowledge concerning that reality in practice? (methodology) (Ibid., pp. 17-18).

The authors reviewed the literature about biodynamic agriculture asking these three questions. To create a frame of reference as a guide for the reader, they compared biodynamic agriculture with the better known paradigms of traditional, industrial, and organic agriculture. Additionally, an interpretation of the descriptions of biodynamic agriculture in the primary sources was made to systematically link and clarify key concepts and principles with those of traditional, industrial and organic agriculture.

Results

The review of literature thus answered the three questions (objectives) of importance to this study. Critical concepts emerged in all three of the areas of inquiry. The core concept in the inquiry of the ontology of biodynamic agriculture is the concept of a "spiritual-physical matrix." This term was developed by the thesis author, Andrew Lorand, to capture this unique concept that has widespread theoretical and practical implications for the study of biodynamic agriculture.

The majority of current scientific study in academia has restricted itself primarily to the quantifiable material/physical realm. The ontology of biodynamic agriculture is far more expansive, according to Rudolf Steiner (1925, 1929), the early 20th Century philosopher and scientist, whose work founded biodynamic agriculture. In addition to physical properties, it consists of elements, principles, and forces that cannot be readily (or at all) seen, touched, weighed, measured or counted. Steiner identified the components of this additional dimension as "spiritual." These spiritual elements and forces are for the most part intangible, invisible and qualitatively different than the elements and forces from the material/physical realm. Steiner observed that contemporary language lacks the appropriate descriptors, terminology and science to readily and accurately observe and describe this spiritual dimension of reality.

The concept of a spiritual-physical matrix of elements, forces and principles includes both the material/physical dimension and the spiritual dimension. What is real (the ontology) is the integration of all of the forces. For the biodynamic practitioner the task is to perceive and analyze based on this expanded reality. Steiner recognized the physical/material world of traditional science, however, he believed that although disciplined, these scientists only perceived part of a much larger whole, and therefore were inaccurate in many of their assumptions and inferences.

These interwoven, interdependent spiritual and physical dimensions described by Steiner, exist and function as a consistent, interactive whole, a matrix of interwoven substances, forces, rhythms, trends and tendencies. According to Steiner, the elements and forces of the spiritual dimension are observable directly by those individuals especially trained through a rigorous path of knowledge targeted at expanding the capacities of thinking and perception to include the spiritual dimensions.

The path to enable anyone to perceive spiritual phenomena directly was described by Steiner in several books and hundreds of lectures. In many respects, the path Steiner describes parallels similar paths of knowledge described by philosophers of many other cultures throughout history (Buddhism, Hinduism, the Yaqui and other Native American spiritual leaders). According to Steiner, the more advanced the individual in his knowledge and discipline, the more he or she is capable of perceiving the spiritual dimensions directly and understanding their effect in the physical/material realm. In some ways Steiner's ideas appear as a synthesis of many ancient, spiritual traditions. However, he added distinct and original insights.

The effects of these spiritual elements and forces can be perceived in the material/physical world, directly and by inference, by people without specialized training, if they have an open mind to such phenomena and use a guided observation. Whether the practitioner has developed his/her insight through following a path of knowledge or not, all agricultural practitioners can put Steiner's suggestions to practical use. However, mastering biodynamic agriculture would include a serious effort at mastering the additional perceptive capacities.

The basic principles of the ontology of biodynamic agriculture are:

Biodynamics is a complex, living and dynamic (spiritual) system of agriculture, in which
-- the earth is a living being in a living universe characterized by a spiritual-physical matrix;
-- substances are carriers of forces that create life;
-- celestial rhythms directly effect terrestrial life;
-- animals and humans emancipate from celestial rhythms; and
-- the farm is a living, dynamic, spiritual individuality (spiritual perspective).

A crucial core concept from the inquiry into the epistemological relationship between the practitioner and agriculture is the diagnostic-therapeutic relationship between the farmer and the farm totality. This farm totality is called the "farm individuality" in biodynamic terminology. This presupposes a comprehensive picture of farm health. Steiner brought forth the analogy of clinical farm practice with clinical human medical practice, again, perceiving human health as far more complex than mere physical health. Thus, the role of a competent biodynamic practitioner is that of perceiving the spiritual forces at work through the material/physical aspects of the farm, and establishing practices that establish, sustain, and when necessary, restore balance and integration of both the spiritual and physical aspects. This leads to a strong preventative, immunologically oriented practice similar to the practices of holistic medicine. Plant, animal and human immunological health form a central pillar of concern in the biodynamic paradigm.

Biodynamic agricultural methods were divided into two categories. However, the inquiry into biodynamic methods demonstrates how both of these two categories lie consistently within the frame of reference established by the ontology and epistemology. The first category of methods used by competent biodynamic practitioners is described as the "biological" methods. These are more familiar to agricultural educators today: mulching, raised beds, companion planting, carefully selected crop rotations, intercropping, green manures, water conservation and revitalization, diversity of domestic animals (and therefore also manures), diversity of field crops, biological pest control, and integrated diversified farming systems (e.g.. gardening, dairy farming and orcharding together) (Philbrick, 1971; Remer, 1986; Pfeiffer, 1977; Storl, 1979; Koepf, 1993).

The second category, the "dynamic" aspects of biodynamic agriculture are less familiar: compost preparations, primary field sprays, teas as foliar sprays and for pest and weed prevention and management, working with celestial rhythms in both plant production and animal husbandry, veterinary homeopathy, and the characterization of each farm as an "individuality." Using these methods appropriately and systematically requires the practitioner to deeply grasp the ontology and his/her role as a diagnostician and therapeutic agent for the farm totality.

Tables were developed that depict the ontological, epistemological, and methodological differences among traditional, industrial, organic, and biodynamic paradigms of agriculture (see tables 1-3). A "knowledge map" of biodynamic agriculture was constructed to translate difficult terms and concepts into a concise, understandable chart of biodynamic agriculture (see table 4). A recommended reading sequence of the four most important sources was offered for the use of agricultural educators who wish to go beyond the tables explaining the paradigm of biodynamic agriculture.

Table 1. Ontology.

Traditional agriculture varies from culture to culture, from region to region, sometimes from tribe to tribe within a culture and a region. It is often a complex, living and dynamic web of relationships, in which:	Industrial agriculture is an economic enterprise aimed at maximum short-term profit based on the most efficient use of resources and maximization of labor and technological efficiencies, in which:	Organic agriculture sees life as a complex, ecosystem in which:	Biodynamics is a complex, living and dynamic (spiritual) system of agriculture, in which:
the earth is a living being within a living universe;	the earth is a relatively unlimited source of exploitable resources;	nature, on earth, is a living ecosystem, albeit purely material;	the earth is a living being in a living universe characterized by a spiritual-physical matrix;
forces are at work in all that is both animate and inanimate;	substances are analyzed for a mechanical/ manipulative use;	substances are analyzed for balanced, ecological use;	substances are carriers of forces (both physical and spiritual) that create life;
celestial rhythms play a role in health and prosperity;	the influence on natural conditions are limited by technology;	natural conditions are accepted and adjusted to;	celestial rhythms directly effect terrestrial life;
animals and humans are an integral part of the whole; and	animals and humans are seen primarily in the context of output and cash flow; and	domestic animals are often excluded for ethical values; and	animals and humans emancipate from celestial rhythms; and
the farm is not considered a distinct being	the farm is often seen as a machine or "factory" (mechanical perspective)	the farm is seen as an integral part of a larger ecosystem. (ecological perspective)	the farm is a living, dynamic, spiritual, individuality. (spiritual perspective)
Although these elements form a whole, the image of health is not necessarily discernible.			

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Table 2. Epistemology.

Traditional	Industrial	Organic	Biodynamic
The traditional practitioner stands in relationship to farming that is characterized by customs, rituals, generational wisdoms, tribal rules, superstitions, religious mores and often other external values.	The industrial practitioner stands in an exploitive business relationship with the "factory" farm. Observation, analysis and policy decisions are made on a bottom line basis. A technological framework shapes and restrains the thinking, problem identification and analysis of the practitioner.	The organic practitioner stands in a benevolent appreciation of the complexity of the ecosystem and attempts to work within the framework of this ecosystem towards sustainability (zero-sum net gains or losses).	The biodynamic practitioner stands in both a supportive and remedial relationship to this complex, living, dynamic farm individuality. Observation, diagnosis and therapy development are the central themes of the practitioner's relationship with the farm.

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Table 3. Methodology.

Traditional	Industrial	Organic	Biodynamic
The traditional practitioner practices often rote patterns of seasonal preparations, planting, cultivation and harvesting based on convention as handed by parents, tribal elders and consistent with customs. Innovations are not continually sought out and typically are slow in acceptance. Biodiversity is part of the traditional paradigm, stemming from the farmer's need for self-sufficiency with as much variety as possible.	The industrial practitioner is successful to the extent that economic profit is maximized. Consequently, methods and practices that lead to efficiencies of technology and labor are employed, assessed, and refined. Innovations are constantly sought out, but evaluated on the basis of their contribution to added profit from the business enterprise, which may come from increased output or decreased input. Biodiversity is inconsistent with efficiency and monocrop production is the rule in the industrial paradigm.	The organic farmer seeks a sustainable subsistence, and restricts his/her activities to non-exploitive practices that "do no harm," and thus that support ongoing sustainability. Innovations are readily accepted to the extent that they enhance sustainability and respect economic limitations. Organic production does not emphasize bio-diversity as an essential principle, and monocrop production is common.	From the diagnostic-therapeutic relationship follows that the biodynamic practitioner's activities are divided into supportive (preventative) maintenance and remedial (therapeutic) interventions. In practice, there is a strong focus on balance, biodiversity, and plant and animal immunity. Innovations often evolve from heightened perception of the soil, plant and animal health rather than from the import of technology. All activities are designed to enable the farm individuality to experience maximum long-term health.

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Table 4. Knowledge Map: The Paradigm of Biodynamic Agriculture

ONTOLOGY → SPIRITUAL-PHYSICAL MATRIX

(What is reality?)

- Substance carries forces *(physical)*
- Rhythms carry vegetative form and growth *(etheric)*
- Freedom from rhythms in animals and humans *(astral)*
- Strong integration of the whole individuality *(ego)*

↓ ↓

EPISTEMOLOGY → DIAGNOSIS-THERAPY APPROACH

(How do we relate to reality?)

- Recognize the physical and spiritual forces at work. Then stimulate or hinder various forces towards balance through specific strategies, using substances, rhythms, and integration.

↓ ↓

METHODOLOGY → BIOLOGICAL & DYNAMIC PRACTICES

(What practices can we develop?)

↓ ↓

- Mulching
- Intercropping
- Companion planting
- Composting
- Green manures
- Cover cropping

- Special compost preps
- Special sprays
- Planting by calendar
- Integration of plants & animals; of field crops, vegetables, and trees

Conclusions

The authors concluded that the biodynamic paradigm of agriculture is complex, difficult to understand, and requires substantial study of the pertinent principles and practices. The seminal works (Steiner, 1925, 1929) contain esoteric concepts written originally in German. These concepts are not well connected to the current knowledge and experience base of agricultural educators. A lack of current information on biodynamics was apparent in the literature review.

A second conclusion was that biodynamics is a comprehensive and systematic paradigm of agriculture. It is an integrated whole where the methods are derivative of the ontology and epistemology. Biodynamic agriculture offers many benefits and opportunities for agriculturists today.

The third conclusion was that the paradigmatic model for inquiry developed by Guba provides a useful, if somewhat challenging, model for the systematic analysis of agricultural paradigms. The analysis helps to understand not only the unfamiliar paradigms (organic and biodynamic agriculture) but familiar paradigms (traditional and industrial agriculture).

Recommendations

Five opportunities emerge where the understanding and communication of biodynamic agriculture can be readily facilitated. 1) The knowledge map should be used for self-study, for presentations on biodynamic agriculture, for seminars or courses, and as a stand alone exhibit. 2) Supplements to the knowledge map (i.e., handouts, overheads, reading lists, experiential learning activities) are needed to develop understanding of biodynamic agriculture. 3) The study of biodynamic agriculture would be better facilitated by a "biodynamic dictionary" that translates Steiner's terminology into more familiar agricultural and scientific terminology. 4) Those who wish to learn about biodynamics should visit practicing biodynamic farmers. Names and locations of existing farms can be secured from the Biodynamic Farming and Gardening Association of North America, Inc., Kimberton, PA. 5) For additional reading, the references in the thesis (Lorand, 1996) should be consulted. To simplify this process the authors recommend the following first and in the sequence given: a) Sattler & Wistinghausen, 1989, Bio-dynamic Farming Practice; b) Storl, 1979, Culture and Horticulture, a Philosophy of Gardening; c) Kolisko & Kolisko, 1978, Agriculture of Tomorrow; and d) The Biodynamic Farming and Gardening Association of New Zealand, 1989, Biodynamics, New Directions for Farming and Gardening in New Zealand.

Educational Importance

Opportunities for a theoretical break-through in agriculture and other fields may come through the rigorous use of paradigmatic analysis. Guba's model provides a form that challenges the student in any field to make explicit basic tenets that are most often left unspoken. Paradigmatic analysis brings to systems thinking a skeletal framework or minimal set of standards to meet in order to assure comprehensive disciplined inquiry. Further, it provides a powerful and transferable model of disciplined inquiry that may lead to better understanding of agriculture.

As the industrial paradigm of agriculture is increasingly challenged by environmentalists and alternative paradigms of agriculture (i.e., organic and biodynamic agriculture) are considered, this disciplined analysis becomes important to separate facts from emotions, myths, and superstitions.

As agriculturists consider the advantages and disadvantages of different paradigms of agriculture, they will certainly turn to agricultural educators for information and help with analysis. Agricultural consultants in countries which are consciously transforming the agricultural sector (i.e., Central and Eastern European countries) particularly need a broad understanding of agriculture and the paradigms under consideration.

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Role of Communication in Promotion of Urban Agriculture and Protection of Environment: a case study in Southern Sri Lanka

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Summary

A large section of the urban population in Sri Lanka, live in inadequate conditions and are confronted with unsurpassed environmental problems due to inappropriate production and consumption patterns that exist in urban areas. These problems can be reduced significantly through promotion of urban agricultural activities by using home waste and other materials.

A field study was conducted during March-August 1996, among a sample of 180 urban dwellers in Matara town area in Southern Sri Lanka by means of a questionnaire survey in order to investigate the present status of urban agriculture and find out various ways which can be used to protect environment. In this paper, while presenting empirical evidence of the study, the author analyses the present status of urban agriculture and argues, the need to concentrate in promoting urban agricultural activities that are taking place in urban areas and how environmental pollution can be overcome in improving such activities and also the role of communication as a way of promoting them.

1. Introduction

The natural environment is a special asset that consists of stocks of various natural resources such as air, water, land, fishery and waste assimilative capability. These provide a variety of services to human beings and they through the process of production and consumption generate waste into the environment (WCED, 1987). The environment has a natural assimilation capacity to absorb waste and convert them back into harmless or useful products. However, if human beings dispose of waste in excess of the capability to absorb it, the environment will damage and the end result would be various form of pollution.

2. Urbanization

In the history of human civilization, people started moving to urban areas due to a variety of reasons such as: economic and social progress, promotion of literacy and education, improvement of general state of health, and greater access to social services, culture and political participation etc. Due to these activities population in urban areas was increased.

In 1990, the World population stood at 2.4 billion, and by the end of this century, 50% of the world's population will live and work in urban areas (United Nations, 1996). Furthermore, United Nations has projected this figure to be 80% by the year 2025.

Anticipations of people who are moving to cities leads to exploitation of resources at a higher rate. Already cities, on 2% of the world's land surface, use some 75% of the world's resources and discharge similar amounts of waste to the local and global environments (United Nations, 1996). As a results, many cities today have faced with environmental problems.

To overcome current problems and to ensure future progress in improving environmental conditions we must begin with a recognition of the challenges facing cities. Therefore, industrial countries as well as developing countries should take steps to balance industrial, trading, commercial activities and environment. This is very important, because by not being concerned we destroy the ecology which we cannot recover it. Protection of ecosystems, preservation of cultural and biological diversity and genetic resources are important not only for their own shake, but in the interest of the humanity.

Urban agriculture is a significant economic activity, central to the lives of tens of millions of people throughout the world. It contributes a large extent to a more diversified and fresh food basket for the urban population while managing the urban waste in an efficient and environmentally sound way.

3. Urbanization in Sri Lanka

In Sri Lanka, twenty one percent of the population live in urban areas (Central Bank, 1992). The urban population is highly concentrated within Colombo Metropolitan Region (CMR), which covers parts of the districts of Colombo, Kalutara and Gampaha and 12 other towns which include: Jaffna, Kandy, Trincomalee, Baticaloa, Anuradhapura, Kurunegala, Galle, Matara and Badulla.

Many urban areas in Sri Lanka today have inappropriate production and consumption patterns which threaten ecological sustainability (Karunadasa, 1995). As a result, a large sections of the urban population live in inadequate conditions and are confronted with unsurpassed environmental problems. Those problems include improper land use, rising traffic congestion and pollution, lack of green spaces and an increasing vulnerability to diseases. These unfriendly circumstances damage the health of thousands of people who are living in such areas.

One of the ways in which environmental problems in urban areas can be reduced through promoting urban agricultural activities by using home waste and other materials. It permits a large part of low income urbanites to get food at a price they can afford and to earn money by selling surpluses on urban markets. Thus, one of the new issues of food security focuses on promotion urban and peri-urban agriculture.

Agricultural activities such as; home gardens (fruits, vegetables, trees, leafy vegetables and ornamental plants etc.), animal husbandry (poultry, piggery etc.) and agro-based industries which are found in urban areas were paid less attention in the past (Hilhorst, 1984). However, these activities have potentials in the development of urban areas.

4. Role of Agricultural Extension

Environmental problems in the urban areas mainly arise either due to ineffectiveness of measures to protect the environment and general mismanagement of natural resource extraction. Urban agriculture can play a significant role in order to prevent environment pollution. For example, in most urban areas in Sri Lanka, a large amount of garbage is disposed daily converting surrounding unpleasant, however, these garbage can be used for productive agricultural purposes.

Agricultural extension in this regard has a major role to play in promoting these activities to bring awareness of the people and those who engaged in agriculture, and also in educating them how to use limited resources while protecting the environment. In addition, people need to be given a thorough knowledge about various techniques that can be used in increasing agricultural activities and also use of waste for agricultural production. This will help to reduce the environmental pollution and in this context, mass communication has a greater role to play.

5. Role of Communication

Use of mass communication in agricultural development grew out of recognition that interpersonal and group communication, although very important, cannot cope up with the need to communicate with the vast audiences on a regular basis (Garforth, 1993). In such a situation when improving urban agriculture and protecting environment, mass media has a great role play.

Studies show that mass media channels are useful for creating awareness and providing information. Mass media channels such as radio, television, magazines, newspapers and audio and video cassettes enable the development planners and professional to reach large audiences rapidly to inform them of new innovations, to change their attitudes, and to motivate them to adopt new innovations. Several factors have contributed to the growing importance and recognition of mass communication in agricultural development programs.

Diffusion studies show that mass media wherever they were institutionalized played an important role in creating awareness, providing information on how to use an innovation and in changing weakly held attitude. The vast gap between change agents and the number of farm families they are required to serve also convinced the planners that alternative channels must be tapped to supplement the work of extension agency. Most countries have realized the tremendous potential in mass media to perform this task (Garforth, 1993). With the development of agricultural research infrastructure within each country as well as internationally, advancement in agriculture and rural development technology has been accelerated. Most countries have found it difficult to keep their change agents fully updated with the information on new innovations. In many developing countries, the resources of mass media have been harnessed to update the knowledge of change agents. Mass media have the capacity to convey the latest information, from most authoritative sources, to the target audiences rapidly, frequently and regularly.

But unlike the interpersonal and group communication channels, mass communication offers limited feedback. Also there is a posibility that mass media message can easily be escaped from the receiver. Another disadvantage is that the receivers have no control on what information they get, and when they can refer back to the material broadcast through radio and television.

6. Objectives of the study

In this paper, in presenting empirical evidence of the study, the author analyses the present status of urban agriculture and argues, the need of concentration in promoting urban agricultural activities that are taking place in urban areas and how environmental pollution can be overcome in improving such activities and also the role of communication as a way of promoting them.

A field study was conducted during March-August 1996, among a sample of 180 urban dwellers in Matara town area in Southern Sri Lanka by means of a questionnaire survey in order to investigate the present status of urban agriculture and find out various ways which can be used to protect environment.

Results of the survey

7 Present Status of Urban Agriculture in Matara

7.1 Land information

The study revealed that in urban areas due to the high population density, land area is very limited. Therefore, the land area can be regarded as one of the main factors affecting the present status of urban agriculture (Table 1). In addition, the ownership of the land is directly responsible for the involvement of urban people in such activities (Table 2).

Table 1 Type of ownership

Type	Percentage
Own	94
Rented	4
Leased	2
Total	**100**

Table 2 The area of each land and their relative proportions

Land extent	Percentage
Below 10 perches	**11**
11 - 20 perches	**35**
21 - 50 perches	**46**
More than 50	**8**

The above results indicated that majority of the people in the sample have more than 20 perches of land and 92% of the total population has their own land. These results gives an indication that Matara urban people has much potential to involve in agriculture.

It was also important to see how these people have utilized their land. The study obtained these information and are presented in table 3.

Table 3 **Use of the land for agricultural activities**

Amount	Percentage	
Below 25 %	71	71
25 - 50 %	22	
Above 50 %	07	
Total	**100**	

According to these data majority (71%) of the urban dwellers who involve in agricultural activities used only 25 % or less amount of their gardens for such activities. Then the consideration was focused on the type of agricultural activities they involved. Details are given in table 4.

Table 4 **Types of agricultural activities**

Agricultural activity	**Percentage (1%)**
Home gardening	88.0
Animal husbandry	04.0
Both	07.0
Total	**100.0**

The results of the survey revealed that home gardening is the main type of agricultural activity in urban agriculture. Data in tables 3 and 4 also showed that there is a scope for improving urban agriculture in Matara.

7.2 Family information

The study also investigated family information of each urban dweller in order to find out available family labour and their leisure time for agricultural activities. The results indicated that male to female ratio was 4:6 in the sample under investigation. 21% of them were categorized into the age groups of below 20 year of age while 12% came to the category of over 60 years of age. This gives us an indication that 67% of the people in the sample were in the working population.

The consideration was then moved to look at the duration of work in order to find out the leisure time of the people which could be utilized in urban agriculture. It was found that within the sample 75 % are employed either in government or private sector, whereas 5 % are farmers or laborers.

According to these figures, it is visible that in Matara urban area has a significant number of unemployed persons (20%) which can be absorbed into urban agricultural activities if they are provided with necessary information and resources. The leisure time of the employed community was also investigated.

Table 5 Leisure time of the employed people

Leisure time per week	Percentage
0 - 10 hours	27.0
11 - 20 hours	27.0
21 - 30 hours	20.0
More than 30	26.0

According to above data nearly 50% of employed people have more than 20 hours of leisure time (Table 5). They can make use of their leisure time for urban agricultural activities which will be a great advantage.

Then our consideration was moved on to look at their knowledge about urban agriculture. It was found that 59% in the sample had some knowledge about urban agriculture, however only 55% of them used this knowledge for urban agriculture. Answering to another question it was found that only 15% of the urban people receive information and advice about agriculture and only 2% said that information and advice are sufficient.

The majority of the people have not received sufficient advice and information. However, 84% of the people in this community like to engage in agriculture if they were given technology and services. This means that there is a big demand for agricultural extension to play in promoting urban agriculture.

7.3 Use of garbage and waste water

Most of the families put their garbage to the road side which is a habitual thing in urban areas. There is no recycling of this garbage. If that garbage stock is not removed in a suitable way, it will lead to a major environmental problem. Details about various ways of which people remove garbage are given in table 6.

Table 6 Garbage disposal system

System	Percentage
Put in to a pit	31.0
Drop in to a stream	3.0
Burning	23.0
Put on the roadside	43.0
Total	100.0

Then a question was asked as to whether they use garbage for agricultural purposes or not. A large majority of people did not use garbage for agricultural purpose, including those who are involved in agriculture. The main reason for removing garbage with out any use is mainly due to the lack of knowledge in converting them into a useful component. These people can be educated to use garbage for agricultural development and thereby reduced environmental problems.

In the urban life there is great value for water. But only very small amount of people used waste water for agricultural purposes. Most of the families remove their waste water to roads or streams or canals (Table 7).

Table 7 Method of disposing waste water

Method	Percentage
Convert in to stream	38.0
Convert in to cultivated crop	24.0
Other	38.0
Total	**100 .0**

In the sample 79% of the people believed that environmental problems can be reduced in doing urban agricultural activities in a systematic manner.

Answering to a question, majority of the people suggested that in improving urban agriculture training programmes, new methods, government interventions is needed (Table 8).

Table 8 Suggestions to protect environment through improving urban agriculture.

Suggestions.	Percentage
Training programmes	46.0
Introduced improved varieties	17.0
Government intermediation	25.0
Rules & regulations	10.0
Water facilities	02.0
Total	**100.0**

By looking at the data given from table 1-8, it could be noted that there is a good potential for improving urban agriculture in Matara, as the land and time can be found. In this situation, extension need to consider these aspects and prepare suitable programme for them. In this regard mass media communication has to be considered as a way of providing necessary advice and information since personal communication is costly and difficult in urban areas. Therefore, the study also investigated the communications aspects.

8. Role of Mass Media

Out of the 84% of urban dwellers who would like to receive information and advise were asked about the way in which they like to receive information and advice on urban agriculture. Their preferences are given in Table 9.

Table 9 Preference of the people for various media methods

Method	Percentage
Radio	18.0
Television	70.0
News Papers	05.0
Leaflets	07.0
Total	**100.0**

Important feature of the above data is that out of the various methods, 70% of them indicated that television media to be the principle and most credible source of communication channel to be used in promoting urban agriculture. Their reasons for selecting television as the best method are given in Table 10.

Table 10 Reasons for selecting television for obtaining information and advice.

Reasons	Percentage
Easy to understand	16.0
No special effect needed	15.0
Easy access	62.0
other	07.0
Total	**100.0**

Answering to another question it was found that the most suitable time for watching television programmes on urban agriculture is during the evenings in weekends (Table 11). The main reason for that was the women in the study area are free during that time and they would like to devote their time for these activities.

Table 11 Most suitable time for watching television progarmmes

Suitable time	Percentage
Morning week days	08.0
Evenings week days	14.0
Mornings week ends	32.0
Evenings week ends	46.0
Total	**100.0**

The results obtained in above will be very useful for extension services to design programs for people on urban agriculture.

Conclusion

In Sri Lanka, twenty one percent of the population live in urban areas. Many cities in Sri Lanka today have inappropriate production and consumption patterns which threaten ecological sustainability. One of the ways in which environmental problems in the cities can be overcome is through promoting urban agriculture.

The results of the field investigations indicated that more than 50% of the people in the sample had at least 20 hour or more leisure time per week which can be used in urban agricultural activities and also majority of the land were about 20-50 perches. This is about 51% of the total and 92% of them had their own land. Furthermore, 74% of them had some form of agricultural crops and flowers in their lands.

Other important findings of the study highlights is that the majority of the people had not receive any advice or information on urban agriculture, however 84% of them wish to engage in urban agriculture if they were given advice, information and other services. Furthermore, 70% of them indicated that the television media should be the principle and most credible source of communication channel to be used in promoting urban agriculture.

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Session B Extension Curricula

Session Chair - Burton Swanson
Adams Room

TITLE: Responsively Reshaping Agricultural Extension Curricula In Universities and Colleges of Sub-Saharan Africa
AUTHORS: M.M. Zinnah, University of Cape Coast, Ghana
Roger E. Steele, Cornell University
D.M. Mattocks, Winrock International Institute for Agricultural Development
D. Naibakelao, Sasakawa Africa Association, Ghana
DISCUSSANT: Layle Lawrence

TITLE: The Birth of a Two Year Post Secondary Agricultural Technology Program at the American Farm School in Greece
AUTHOR: John R. Crunkilton, Virginia Polytechnic Institute and State University
DISCUSSANT: Layle Lawrence

TITLE: Means V. Ends: Communication Technology as a Lever To Advance Internationalization
AUTHOR: Betty L. Wells, Iowa State University
DISCUSSANT: Layle Lawrence

TITLE: Attitudes Affecting Peruvian Farmers' Choices: The Influence of Selected Factors
AUTHORS: David R. Dominguez, Arlen Etling
The Pennsylvania State University
DISCUSSANT: Rama Radhakrishna

RESPONSIVELY RESHAPING AGRICULTURAL EXTENSION CURRICULA IN UNIVERSITIES AND COLLEGES OF SUB-SAHARAN AFRICA[1]

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Agricultural universities and colleges in Africa and in other parts of the world are under scrutiny about the quality, responsiveness and relevance of their programs. The need to strengthen the capacities of agricultural universities and colleges to develop responsive curricula at all levels is critical due to the accelerating pace of technological changes in agriculture, and the emerging challenge to train agricultural graduates with problem-solving skills (Flora, 1992; Kranz Jr, 1995; Vietor & Moore, 1992). The need to develop responsive agricultural curricula, as Cleaver succinctly points out "is not only quantitative but qualitative (p.14)." He goes on to say that "generally, agricultural curricula from primary to university level need to be made more relevant to each country's agricultural situation, and more closely connected to the realities of African farming" (Cleaver, 1993).

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The Context

A study by the Food and Agriculture Organization of the United Nations (FAO, 1990) estimates that 56.3% and 32% of extension staff in Africa possess academic qualifications at secondary and intermediate levels, respectively. The same study also estimates that the ratio of extension staff to farmers in Africa is about 1:1809. Given the very low level of education of extension staff, and the extension staff:farmer ratio, it is not surprising that extension organizations are functioning poorly in Africa.

An agricultural extension revitalization initiative which is geared toward upgrading the professional level of mid-career agricultural extension staff was launched in 1993 at the University of Cape Coast in Ghana. Alemaya University of Agriculture in Ethiopia began a similar program in early 1997. Other universities in Africa, including Sokoine University of Agriculture in Tanzania and Makerere University in Uganda, have begun work in the process of initiating similar programs.

The initiative described in this paper is funded by Sasakawa Africa Association (a Japanese nongovernmental donor agency), with significant matching contributions from the ministries of agriculture and host universities in each African country. Winrock International Institute for Agricultural Development (a nongovernmental development agency based in the USA) plays the role of a catalyst in the design and implementation of the various programs under this initiative.

This paper builds on the experience of the authors who have worked with selected universities and colleges, ministries of agriculture, and non-governmental organizations in sub-Saharan Africa in the *process* of reshaping or revitalizing undergraduate agricultural extension curricula over the past decade. Their initiatives have assisted universities to become more responsive to the realities of each country's unique agricultural situation through training of experienced, mid-career agricultural extension staff who are currently working with ministries of agriculture and non-governmental organizations (NGOs) engaged in agriculture and rural development.

This paper is a synoptic description of the *dynamic process* of developing responsive undergraduate agricultural extension curricula based on examination of needs expressed by different stakeholders. Various theoretical frameworks, with special emphasis on those related to experiential learning, are used by the authors to frame the description and analysis.

The Revitalization Process

Most of the agricultural colleges and universities in sub-Saharan Africa were established in the 1950s and 1960s following attainment of national independence. Over the years these universities and colleges have developed many academic programs at the certificate, diploma, baccalaureate and postgraduate levels and have evolved in many different ways. But, as Saint succinctly points out (p.xi):

> Africa's universities currently stand at a pivotal point in their development. The mandates given them at independence now require reassessment as a result of changes in the world, in Africa, and the universities themselves (Saint, 1992).

Agricultural universities and colleges in sub-Saharan Africa are generally a part of the government system. Government financed and controlled, they tend to underestimate the importance of the social science component of the curriculum. Although knowledge and skills in the "technical" subjects form an important technological base, a firm understanding of the social sciences, particularly agricultural extension, is important if agricultural knowledge is to be utilized by farmers.

The First Step

The first step in facilitating revitalization of a curriculum is the clarification of the vision or beliefs about the training program. In an effort to deliver demand-driven programs, interest groups (particularly the ministry of agriculture and nongovernmental organizations engaged in agriculture and rural development) approach a host university about the need to offer a program for their mid-career agricultural extension staff. Stakeholders are assisted in stating and/or clarifying their vision about the need for developing a training program for mid-career agricultural extension staff, the type of curriculum for the program, and the strategies for effectively implementing the program. Developing curricula involves putting into action a system of beliefs about learning, knowing, and social relationships.

The statement and/or clarification of the vision or beliefs usually revolves around the following key questions: 1) What are the stakeholders' understanding of the mid-career extension staff who are to enroll in the training program? 2) What are the stakeholders' opinions about the conditions or environment that will support and enhance the extension staff's learning? 3) What are the stakeholders' views about how the extension staff could be helped to persist in the learning, both during and after the training program? 4) What are the stakeholders' views about how the program is to be funded and sustained?

These questions guide the stakeholders in examining the expressed need to revitalize the extension education curriculum, and the actions required to bring about the change. The process usually involves a combination of a formal needs assessment, informal discussions with stakeholders, and a workshop involving representatives of the stakeholders. Holding a workshop is critical in the process of arriving at a responsive curriculum. It provides an opportunity for the stakeholders to discuss and arrive at a consensus regarding the vision of the program, course contents, criteria for the selection and admission of students, and linkages of the program. The workshop also affords the stakeholders, especially the university staff, an opportunity to raise questions and voice concerns about the training of mid-career extension staff.

The following questions are often raised and discussed during workshops:

(1) Is the university campus the most appropriate and effective place for students to learn?
(2) Do university students need to be under the constant watchful eyes of university lecturers to maximize learning?
(3) Is it the role of agricultural extension staff to be a conduit for the transfer of information from researchers to farmers?
(4) Should extension staff visualize their primary role as that of teachers?
(5) Might extension workers be more effective if they thought of themselves as co-learners with farmers?
(6) Are individuals who have been taught correct knowledge and information, as certified by advanced post-graduate credentials of M.Sc. or Ph.D., the most effective teachers?
(7) Are field resource people who possess lower academic qualifications, such as certificate, diploma, or B.Sc., less qualified than those individuals with post-graduate degrees to teach university students?
(8) Does allowing resource people with lower academic credentials participate as part of a teaching team compromise academic rigor?

Facilitating dialogue around these concerns helps incorporate knowledge, competencies, and experiences of all stakeholders during the program conceptualization and development process. It also assists in developing partnership between organizations working in the agricultural sector. These partnerships are vital for resource mobilization (both human and financial) and the sustainability of such a demand-driven program.

The Second Step

Development of the curriculum itself, the second step, is guided by four criteria:

(1) It must deal with the pragmatic needs of mid-career agricultural extension staff, including the acquisition of knowledge and skills in communication, problem-solving, critical thinking, and learning how to be co-learners with others.
(2) It must be as closely related to the participants real work environment as possible.
(3) It must provide a dynamic interplay between theoretical propositions and practical experiences.
(4) It must expose participants to issues of food security, role of women in agriculture, and relationships between population and food production.

The process of developing or revitalizing a curriculum, as Kranz (p.8) points out, is "a contest, with the outcome negotiated among faculty and various constituent groups by academic planners and administrators (Kranz Jr, 1995)." Sometimes the stakeholders will be in general agreement and the curriculum revitalization process will be clear, as was the case with the process which led to the launching of the first initiative at the University of Cape Coast in Ghana in 1993. In other cases, it can be a long and excruciating process, including several collaborative workshops and negotiation of a more-formalized memorandum of understanding, as was the case with the second initiative launched in 1997 at Alemaya University of Agriculture in Ethiopia. The negotiation of power and interests among the stakeholders in Ethiopia was very slow due to the government's decentralization and devolution of power. Representatives of the stakeholders in Ethiopia were in agreement about the urgent need to provide training opportunity for mid-career agricultural extension staff in Ethiopia. However, discussions about the process of revitalizing the curriculum at Alemaya University of Agriculture had to be conducted not only with central, but with regional government officials.

One unique and very important element is never compromised in the process of curriculum revitalization. Adequate attention and time must be allocated to the off-campus practical learning component of the program. The Supervised Enterprise/Experience Projects (SEPs) constitute the nerve center of the curriculum revitalization initiative. They afford students an opportunity to return to their work environment to conduct independent or group self-designed experiential learning projects (the SEPs) in their real work environment. Field-based programs are designed to narrow the gap between the intentions/beliefs (espoused theories) and actions/practice (theories-in-use) of each student (Argyris & Schon, 1996). The SEPs, which generally last for a period of about eight months, are designed to create the conditions for experiential learning (Kolb, 1984; Macadam & Bawden, 1985), "double-loop learning" (Argyris, 1993), and "learning as a way of being" (Vaill, 1996).

The SEPs are also meant to: (1) immerse students in valuable farmer-focused, experience-based learning activities, (2) reduce the discrepancy between the training and the various tasks the extension staff are to perform in their real work environment, and (3) avoid the tendency of making the training overly theoretical (Zinnah, 1995; Zinnah, Steele, Kwarteng, Ntifo-Siaw, & Carson, 1996). The students' ability to detect errors or problems and to explore practical ways and means of correcting them is the essence of the SEPs.

Field-based resource persons are usually identified and asked to serve as co-supervisors of the students. They assist the university lecturers with monitoring and supervision of student projects. Farmers and community groups who may be affected by a proposed project are involved in the entire process. The level and nature of the involvement of beneficiaries in the project are important criteria that are used to judge the success and sustainability of each SEP.

There is a strong extension education bias in the B.Sc. Agricultural Extension curriculum at the University of Cape Coast. Approximately one-half of the total credit points required to graduate from the mid-career B.Sc. programs are devoted to extension and extension-related courses. By contrast, in the existing four-year B.Sc. Agriculture curriculum, less than one-tenth of the instructional time is devoted to extension or extension-related courses. Most of the graduates from both the new mid-career program and traditional four-year B.Sc. program will be working with farmers. They will find jobs that put them in the field, at regional, district or village levels, supervising and managing strategic agricultural extension programs.

The Third Step

Curriculum revitalization, the third step, is the brokering of a strong network among local and foreign institutions and agencies, both public and private, whose participants are committed to revitalization of agricultural extension curricula. Change, especially radical change of academic programs within institutions of higher learning, is difficult. It often requires a paradigm shift as well as very strong leadership. More importantly, the issue of maintaining academic rigor always surfaces when one talks about curriculum revitalization. As a result, university administrators and staff are usually very cautious in launching new programs that are non-traditional or out of the mainstream.

The forging of strong institutional linkages is meant to facilitate the recognition by stakeholders of an enduring and shared commitment, and the need for each of them to benefit from the diverse talents, resources, experiences and perspectives within the partnership (Bagchee, 1994). Representatives of partner institutions and agencies are encouraged and supported to participate in workshops and study tours to share their experiences and vulnerabilities, and to support the risk-taking which is inherent in innovative and non-traditional ventures such as the revitalization of curricula.

Lessons Learned

Experience gained during the past five years of this program indicates that genuine dialogue and collaboration between agricultural institutions of higher education, farmers, public and private agricultural organizations can lead to jointly agreed-upon responsive training programs. It is also becoming clear that training programs developed by agricultural institutions of higher education as a result of dialogue and collaboration with stakeholders ensures strong commitment and support, particularly on the part of administrators and staff.

Support was also gained to substantiate Wilson and Cervero's (p.95-97) assertions that: (1) planning responsively means actively accepting the risks and rewards of the outcomes of our planning work, (2) planners have to be able to read the power and interests in a given planning situation, and (3) it is irrational to follow the same steps in every situation because curriculum revitalization is a process rather than a recipe or a set of principles. Different circumstances call for different responses (Wilson & Cervero, 1996a; Wilson & Cervero, 1996b).

Conclusion

The major conclusion of the initiative discussed in this paper is that the process of revitalization of any curricula must be based on the process of learning, the issue of paradigms, and the nature of systems (Bawden, 1995). Curricula should not be built merely on the mastery of cognitive contents, facts, and methods imparted to the learners. Effective extension education curricula should emphasize learning as self-directed, creative, expressive, online, continual, and reflexive (Vaill, 1996). The emphasis should be to overcome passivity, helping learners give meaning to all aspects and components of propositional and practical learning.

There is a demonstrated and urgent need for agricultural and extension education in sub-Saharan African countries (Steele, Onyango, Keregero, & Dlamini, 1993). There is also considerable need for improving the training of agricultural extension staff, especially mid-career staff (Steele, 1996). Efforts are underway to spread the idea across sub-Saharan Africa (Steele, Turnbull, & Turnbull, 1995). The main aim is to share experiences among institutions and agencies committed to the same vision - the training of mid-career agricultural extension staff. Already the momentum is building. Major universities in sub-Saharan Africa, including Alemaya University of Agriculture in Ethiopia, Sokoine University of Agriculture in Tanzania, Makerere University in Uganda, and the University of Cape Coast in Ghana have embraced this new approach to training mid-career extension staff.

Educational Importance

The authors' reflection on their experience with this innovative initiative in the revitalization of agricultural extension curricula in sub-Saharan Africa has implications for developing responsive curricula for other fields of study. The initiative emphasizes holism in the process of developing responsive curricula - perceiving students (participants in the course), the university, the users of the graduates (ministry of agriculture, NGOs, farmers,) and other interest groups as a community of learners and as stakeholders. The paper also shares important lessons that have been learned by the authors about the importance of negotiating power and vested interests with various stakeholders in the curricula revitalization process.

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THE BIRTH OF A TWO YEAR POST SECONDARY AGRICULTURAL TECHNOLOGY PROGRAM AT THE AMERICAN FARM SCHOOL IN GREECE

1997 ANNUAL CONFERENCE OF AIAEE
April 3-5, 1997
Quality Hotel, Arlington, Virginia

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INTRODUCTION

The American Farm School in Thessaloniki, Greece has been providing educational programs for Greek youth since 1904. The original agricultural curriculum emphasis has broaden over the years to include academic education and other vocational subjects. In recent years, youth in Greece have had increasing difficulty in continuing their education after graduation from secondary schools due to the intense competition for limited spaces in institutions of higher education.

The situation of not being able to pursue additional education beyond secondary schools has been a particular concern to those who have an interest in agriculture and the desire to continue their education. Since the Farm School has a rich history and an excellent record of responding to the educational needs of Greece's agricultural society and industry and saw a need to provide an educational program to fill a void, they decided to initiate a two year, post-secondary degree program in agriculture which will be taught in English.

PURPOSE OF PAPER

The author of this paper received a Fulbright Scholarship in the Fall of 1995 to spend at the Farm School in Greece to assist in the development of the framework and curriculum for a new post-secondary degree program. The major purpose of this paper is to describe the process which led up to the formation of the new College and the major decisions that must be made by any institution in an international setting desiring to develop and implement such a program.

RESULTS OF THE MARKET SURVEY

Before the Farm School embarked on the goal to start a new post-secondary program, they conducted a survey to determine the needs of such graduates from a post-secondary program and to identify crucial skills that the agricultural industry would like to see in graduates from the program. They contacted 54 representatives or individuals in the following businesses: production agriculture, processing of agricultural products, agricultural supplies and inputs, and non-agricultural business sector. Appendix A reports several of their findings. In summary, the type of employees needed were market/sales personnel, middle managers, high level technicians, and agricultural specialists. In response to middle manager skills desired of employees, the following skills were mentioned in order of importance: ability to learn and apply new techniques, team work; leadership/administrative; specific agricultural subjects, communication; and computer. In identifying criterion used to hire new employees, the following characteristics were mentioned: education/subject matter, personality, work experience, character, industriousness, and team work. Eighty-seven percent of the respondents indicated a willingness to participate in the practical training program(internship) required in the proposed associate degree program. The American Farm School concluded from these findings that the agricultural industry was indeed interested in hiring graduates from this program and that the industry would be willing to cooperate with the School in implementing the required internship.

Another effort on part of the Farm School was to survey student interest in such a program. From their contact with students enrolled in the secondary program at the School and a survey of students who were graduating from other secondary programs in Greece, it was concluded that students would be interested in the program, both as a terminal degree and as a transfer program.

DEVELOPING A TIMETABLE OF ACTIVITIES AND WORK TO FORM A NEW EDUCATIONAL PROGRAM

One of the first tasks during my visit to Greece was to develop a plan of action that would lead the Farm School toward achieving the goal of implementing a new educational program. A proposed activities and projected timetable was developed for their review and input. After the opportunity to review what the author developed, the final document was copied and shared with relevant administrators and the Board of Trustees of the School. A copy of that timetable is included in Appendix B. It is divided into two parts: those activities that relate to the **academic** decisions and tasks ahead as the School develops and implements such a program; and the second part related to the **administrative** decisions and tasks associated with the development and operation of a new program. Due dates were set for each task and individuals responsible for seeing that the task was accomplished were identified. Where several people were listed to work on a task, one person was designated to provide the leadership in the committee. This Activities and Projected Timetable proved to very effective in accomplishing vital tasks in a timely fashion.

FORMING A MISSION STATEMENT AND GOALS OF THE COLLEGE

A critical task in the formation of any new educational program is to determine the mission and goal(s) of the new unit. Without agreement on these two things, the School would never know if it was accomplishing what it should be doing or offering the type of curriculum that is of interest and value to students. Appendix C contains the mission and goals for the new College. These statements went through many revisions and changes, and they were reviewed and approved by the School's Board of Trustees.

DEVELOPING A CURRICULUM

While the tasks up to this point at first appear to be relatively simple, they involved many hours of discussion and reflection, and were very important for the tasks to come. The curricular emphasis of the new College in the beginning was placed on teaching and developing those skills needed of graduates as they enter mid-management and technical level positions in the agricultural industry. Furthermore, it was assumed that in the earlier years of the College, students were likely to seek employment immediately after College and not focus on plans to continue their education. Thus, the curriculum developed reflects a technical, practical, and hands-on approach. After the program matures and gains acceptance, it is probable the College will revise its curriculum to add a transfer course of study.

A major decision was "What options or majors should the curriculum emphasize?" Based on the Greek agricultural industry, the results of the survey of the industry representatives, and the Farm School strengths, it was decided that two options would be offered, that of Agricultural Production and Agricultural Business.

The courses developed for each option are found in Appendix D. The degree requires 67 semester credit hours. A set of 30 hours of core courses required of all students were identified, focusing on basic plant and animal sciences, mathematics, communications, computers, business, environment, contemporary issues, and a required internship. Each of the options contained a list of option specific courses to take(26 in Agricultural Business and 29 in Agricultural Production). Elective credits for each were 11 and 8, respectfully.

GUIDELINES PROVED USEFUL IN DEVELOPING A NEW TWO YEAR, POST-SECONDARY AGRICULTURAL PROGRAM IN GREECE AND WHICH COULD PROVE USEFUL IN DEVELOPING NEW PROGRAMS IN INTERNATIONAL SETTINGS

1. Any new program must be based on demonstrated need and expressed interest of the agricultural industry.

2. A clear mission statement of the new program that falls within the scope and philosophy of the current educational programs of the institution must be developed and agreed upon by all parties involved.

3. The understanding and support of the Ministries of Education and Agriculture must be obtained early in the development of the program.

4. The program to be planned must be a quality educational experience, rigorous, and with an integral hands-on experience required of the students.

5. Where a current institution exist and the two year program will be an add on, participation of individuals from that institution to promote and assure ownership of the new program is vital.

6. Assure that existing facilities and equipment are adequate for offering the proposed curriculum and if they are not, finances are available to permit renovation and/or construction of new facilities.

7. Assure that adequate instructional and textbook materials can be obtained for the proposed courses and for placement in a library.

8. Determine that a supply of potential, qualified faculty are available to teach the proposed courses.

9. Develop a comprehensive public relations program with relevant brochures and news releases to promote the program and use in recruitment activities, for reporting on program initiation and growth, and for recognizing graduates.

10. Meet with other educational groups, institutions, administrators, and teachers to help acquaint them with the new program, its mission and emphasis.

11. Develop a detailed plan for receiving, processing, and maintaining student applications, student academic records, financial transactions, and other academic and administrative details.

12. Develop a financial plan that details what is estimated to be the cost of such a program and how the program will be funded.

13. Start the new program small, in terms of enrollment and options, and keep the academic course offerings simple. Allow the program in terms of student enrollment and offerings to grow gradually.

14. Plan for periodic evaluation of all aspects of the program.

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APPENDIX A

Results of the Market Survey

Survey Respondents	N
Agricultural Production	13
Agricultural Processing/Commerce	16
Agricultural Supplies/Services	11
Non-agricultural Industry	14
TOTAL	54

Type of Manager-Level Employee Needed	N
Market/sales Personnel	32
Middle Manager	21
High Level Technician	18
Agricultural Specialist	17
Specialized Production Worker	10

Important Middle Manager Skills	N
Ability to learn and apply new techniques	23
Team work	23
Leadership/administrative	22
Specific agricultural subjects	17
Communication	13
Computer	8

Willingness to Participate in Practical Training	N
Yes	47
No	7

Criterion Used to Hire New Employees

Education/subject matter
Personality
Work experience
Character
Industriousness
Team work

Implementation of the Post-Secondary Program of Applied Agricultural Sciences
Activities and Projected Timetable
October 1995

Appendix B

I	*Academic Activities*	*Due Date*	*Person(s) responsible**
1	To develop Post-secondary program's mission and goal statements a. Review AFS Proposal and Market Survey Results b. Review European Documents c. Review US materials d. Prepare draft statement e. Review by appropriate AFS staff/Board f. Revise mission and goal statement	Oct. 15,1995 Ja 15	GD / BF / JC
2	To design overall curriculum structure a. Determine core curriculum b. Determine speciality option(s) c. Set degree requirements d. Establish grading policy e. Develop procedures for option and course approvals	Nov. 1, 1995	JC/GD/IV/BF/AS
3	To determine speciality option(s) a. Determine required courses b. Identify elective courses c. Develop graduation checksheets	Nov. 1, 1995	JC/GD/IV/BF/AS
4	To develop course syllabi a. Develop course syllabus format b. Develop syllabus for each course	May 1, 1996 October 15, 1995	JC/Dean/Fac
5	To establish course scheduling details a. Determine course sequencing b Develop course timetable c. Identify room/laboratory assignments d. Establish exam schedules e. Develop preregistration procedures f. Coordinate with AFS practical training and academic programs	Mar. 1, 1996	Dean/JC/GD/BF GK GK GK GK GK
6	To provide academic services a. Set up advising procedures b. Form student organization club c. Establish internship program d. Establish honors program	April 1, 1996	Dean/GD/GK
7	To establish academic policies a. Establish policies for transcript analysis for transfer work b. Develop process for student appeals c. Develop procedures for testing out of courses d. Establish academic eligibility schedule e. Develop procedure for academic probation, suspension and re-entry	April 1, 1996	Dean/GD/GK

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II	*Administration Activities*	*Due Date*	*Person(s) responsible**
1	To complete appropriate Post-secondary program administration details	On - going	
	a. Finalize name for the new Post-secondary program	Oct. 15, 1995	GD/BF/JC
	b. Define role and authority of Advisory Group	Oct. 15, 1995	GD/AFS Board
	c. Establish Post-secondary program Advisory Group	Dec. 1, 1995	GD/AS/IV/JC
	d. Develop Post-secondary program Catalog		BF/GD/GK/JC
	e. Revise AFS Administrative Flow Chart		GD
2	To review proposed financial budgets a. Review current short and long range budget proposal b. Determine tuition and fees c. Set policy on student textbooks (purchased or provided)	Dec. 1, 1995	GD
3	To coordinate with appropriate governmental/educational units	Dec. 1, 1995	
	a. Contact Greek governmental units/bodies		AS/GK/DM
	b. Contact Greek educational units/bodies		AS/GK/DM
	c. Explore articulation/transfer/MOU agreements in U.S. and U.K.		GD/BF/JC
	d. Explore procedures for listing Post-secondary program in Institutions of International Education		JC
	e. Explore jurisdiction for accreditation of the Post-secondary program in U.S. and International settings		JC
4	To develop public relations (PR) plan a. Develop long-range public relations plan 1. Identify groups to receive PR, recruitment and internship materials 2. Identify PR, recruitment, and internship materials needed 3. Prepare media plan 4. Determine method and schedule for dissemination 5. Determine on-going PR plan b. Integrate into AFS public relations plan c. Develop AFS internal information sharing process d. Identify plan for annual fund raising for the Post-secondary program	Dec. 1, 1995	JR/BF/GK/RW
5	To develop recruitment strategy a. Identify groups to contact b. Develop plan of action to contact target groups c. Develop draft of recruitment materials needed d. Recruitment materials reviewed by appropriate AFS staff e. Revise recruitment materials f. Print materials g. Disseminate materials	Feb. 1, 1996	GK / RW

6	To develop admissions guidelines and forms a. Establish admission criteria b. Develop admission policies and guidelines c. Develop admission forms d. Establish procedure for review of applications	Feb. 1, 1996	Dean/GD/BF/JC
7	To meet Post-secondary program personnel needs a. Establish search procedure for Dean of the Post-secondary program b. Write job descriptions of Faculty and Staff c. Prepare order for hiring d. Advertise e. Hire f. Develop procedures for review and reappointment of personnel g. Develop orientation program for new staff h. Explore professional development program for Post-secondary program staff i. Explore relationship with Post-secondary program and AFS faculty	Nov. 1, 1995 Mar. 1, 1996	GD Dean/GD/BF
8	To establish academic record keeping system (Registrar) a. Develop procedures for recording grades b. Check for possible government policy implications c. Develop procedures for fulfilling requests and transcripts d. Design diploma layout e. Maintain file of approved course syllabi f. Provide computerization of Registrar system	April 1, 1996	Dean/BF/GK
9	To determine student services needed a. Provide health needs b. Provide recreational and cultural needs c. Establish job placement services d. Determine library needs e. Identify housing needs f. Identify food needs g. Provide student lounge h. Establish transportation/car policies i. Develop remedial programs j. Establish Alumni relations program	Feb. 1, 1996	GK/GD/BF
10.	To determine capital campaign development and fund- raising plan	October 15	AFS Board

Initials underlined give leadership to task

* GD - George Draper
JC - John Crunkilton
GK - George Koulaouzides
DM - Dimitris Michailidis
Fac - Post-secondary program Faculty

IV - Ioannis Vezyroglou
AS - Andonis Stambolides
BF - Barry Freckmann
JR - Joann Ryding
RW - Randall Warner
Dean - Administrative Head of the Post-secondary program,

Appendix C

COLLEGE PROGRAM
OF
AGRICULTURAL STUDIES

MISSION AND GOAL STATEMENT

☑ Mission

The College program of Agricultural Studies at the American Farm School is a two year college level program leading to an Associate of Agricultural Studies Degree. The **mission** of the College program is to prepare individuals to assume technical and mid-management positions in a rapidly changing and diverse agricultural industry in Greece, the Balkan Region, and European Union countries.

☑ Primary Emphasis

The **primary emphasis** of the College program is on the practical application of knowledge gained in an academic environment. The College program offers college level courses and related practical experiences which emphasize the application of content learned in classrooms and laboratories to the agricultural industries. This melding of practice and theory is carried out through a combination of basic education courses, science based lecture and laboratory courses, professional and personal development activities, and practical experience involving both the School's demonstration farm and production units, and a required formal internship program in the private sector.

☑ Goals

The College program's four major **goals** are to:

1. prepare students for the application of the latest agricultural technology and agribusiness management skills at mid-management and technical levels in the agricultural industry;
2. develop a basic foundation in the agricultural discipline for those students who wish to pursue further study or practical training in agriculture;
3. develop interpersonal, leadership, communication, entrepreneurial, problem solving, and critical thinking skills and abilities; and
4. develop an awareness and sensitivity to contemporary global issues and interdependencies.

Appendix D

DIMITRIS PERROTIS COLLEGE OF AGRICULTURAL STUDIES

CURRICULUM STRUCTURE

CORE COURSES (REQUIRED OF ALL STUDENTS)

Course title	Credits
1. Introduction to Computer Systems	2
2. Computer Applications	2
3. Applied Mathematics & Statistics	3
4. Communication I	3
5. Communication II	2
6. Agricultural Production	3
7. Agriculture & Environment	3
8. Agriculture Processing Technology	2
9. Introduction to Agribusiness	3
10. Contemporary Agricultural Issues	2
11. Internship	5
TOTAL	30

OPTIONS AND REQUIRED COURSES WITHIN EACH OPTION

Agricultural Business			**Agricultural Production**	
Course title	**Credits**		**Course title**	**Credits**
1. Agribusiness Management	4	⇨	1. Elective	
2. Agricultural Economics	3	⇨	2. Elective	
3. Agricultural Finance	3	⇨	3. Elective	
4. Accounting	3	⇨	4. Elective	
5. Entrepreneurship	3	⇨	5. Elective	
6. Property Management and Law	2	⇨	6. Elective	
7. Agricultural Organizations	2	⇨	7. Elective	
8. Personnel Management	2	⇨	8. Elective	
9. Agricultural Marketing I	2	⇨	9. Elective	
10. Agricultural Marketing II	2	⇨	10. Elective	
11. Elective		⇦	11. Farm Business Management	3
12. Elective		⇦	12. Animal Nutrition	3
13. Elective		⇦	13. Animal Reprod. and Breeding	3
14. Elective		⇦	14. Agricultural Machinery	3
15. Elective		⇦	15. Pest Management	3
16. Elective		⇦	16. Plant Propagation & Breeding	3
17. Elective		⇦	17. Crop Production	3
18. Elective		⇦	18. Irrigation and Drainage	2
19. Elective		⇦	19. Farm Building Construction	2
20. Elective		⇦	20. Soils and Fertilizers	2
21. Elective		⇦	21. Horticultural Production	2
TOTAL	26		**TOTAL**	29

ELECTIVES

	Agricultural Business	Agricultural Production
Course title	Credits	Credits
Electives noted above	11	8
Independent Study	Variable Credit	Variable Credit
Field Study	Variable Credit	Variable Credit
Special Study	Variable Credit	Variable Credit

TOTAL GRADUATION REQUIREMENT = 67

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COURSE SEQUENCE BY OPTION AND SEMESTER

Semester	Agricultural Business Option		Agricultural Production Option	
	Course title	**Credits**	**Course title**	**Credits**
Fall-1	Introduction to Agribusiness	3	Introduction to Agribusiness	3
	Agricultural Production	3	Agricultural Production	3
	Communication I	3	Communication I	3
	Applied Mathematics & Statistics	3	Applied Mathematics & Statistics	3
	Introduction Computer Systems	2	Introduction Computer Systems	2
	TOTAL	**14**	**TOTAL**	**14**
Spring-1	Agriculture and Environment	3	Agriculture and Environment	3
	Computer Applications	2	Computer Applications	2
	Communication II	2	Communication II	2
	Agriculture Processing Technology	2	Agriculture Processing Technology	2
	Accounting	3	Agriculture Machinery	3
	Agricultural Marketing I	2	Farm Building Construction	2
	TOTAL	**14**	**TOTAL**	**14**
Summer	**Internship**	**5**	**Internship**	**5**
Fall-2	Agricultural Economics	3	Animal Nutrition	3
	Agricultural Finance	3	Farm Business Management	3
	Agricultural Organizations	2	Plant Propagation & Breeding	3
	Agricultural Marketing II	2	Irrigation & Drainage	2
	Contemporary Agricultural Issues	2	Contemporary Agricultural Issues	2
	Electives		***Electives***	
	Plant Propagation & Breeding	3	Agricultural Economics	3
	Animal Nutrition	3	Agricultural Finance	3
	Irrigation & Drainage	2	Agricultural Organizations	2
	TOTAL	**17**	**TOTAL**	**18**
Spring-2	Agribusiness Management	4	Crop Production	3
	Entrepreneurship	3	Animal Reproduction and Breeding	3
	Personnel Management	2	Pest Management	3
	Property Management and Law	2	Horticultural Production	2
			Soils & Fertilizers	2
	Electives			
	Crop Production	3	***Electives***	
	Animal Reproduction & Breeding	3	Entrepreneurship	3
	Pest Management	3	Accounting	3
	Farm Building Construction	2	Personnel Management	2
	Horticultural Production	2	Property Management and Law	2
	Soils & Fertilizers	2	Agricultural Marketing I	2
	TOTAL	**17**	**TOTAL**	**16**

TOTAL GRADUATION REQUIREMENTS = 67

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Means v. Ends: Communication Technology as a Lever to Advance Internationalization

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Abstract

Case study of Iowa State University (ISU) explores the conjunction of communication technology and internationalization, first by examining the placement of communication/information technology and international programs in ISU's strategic plan. An analysis of distribution of internationalization seed grants, across the six goals of ISU's strategic plan, shows that the content of proposals submitted is being influenced more by the technology-related goal than by the five other primary goals. The implications for internationalization/ globalization are considered. A subsequent examination of ISU's web pages reveals little correspondence between the two media, with international programs nearly invisible.

Introduction

> *We live in an era in which international cooperation has never been as technically possible (thanks to telecommunications and education), nor more essential.*
>
> Madeleine Albright

The conference theme, Communication Technology Linking the World, has challenged me to explore the conjunction of communication technology and international programs. Indeed, the request for papers arrived while I was investigating the utility of and relationship between my university's strategic planning document and web pages as organizing frameworks and tools for advancing internationalization efforts. Exploring the synergy between information/communication technology and internationalization was a logical next step. I questioned the impact of information/communication technology on internationalization: would it become an ends in itself, or be conceived (more appropriately, I thought) as a means to an end?

Purpose

The purpose of this paper is to explore the nexus of communication technology and the international programs of Iowa State University as reflected in its strategic planning document and World Wide Web pages, and the broader implications of communication technology for international programs.

Methods and Data Sources

This report is primarily a case study of Iowa State University. The primary data sources are ISU's strategic planning document, competitive internationalization seed grants awarded, and web pages. I first examine the placement of communication technology and international programs in ISU's strategic plan. I next analyze the internal distribution of internationalization seed grants to determine how the grants are distributed across the six goals of ISU's strategic plan. I then examine ISU's home page to determine its relationship, if any, to the strategic plan and effectiveness in advancing international programs at ISU.

Strategic Planning Document(s)

A Research Agenda for the Internationalization of Higher Education in the United States (Burn and Smuckler, 1995) indicates, in two places, possible benefit in examining institutional planning documents. It asks:

> What are the strategies for the internationalization of an institution as reflected in the institutional plan and mission statement? (p. 17)
>
> What do current institutional mission statements in various segments of higher education say about global and international commitment? (p. 29)

Stempel (1996:83), drawing from a survey of 281 institutions by the American Association of State Colleges and Universities in 1995, points to a disjoint between rhetoric and reality: while over half of the institutional mission statements include language supporting internationalizing the campus, and one-third refer to specific goals pertaining to faculty involvement in international activities, faculty reward and support systems do not specifically encourage international expertise.

What can one tell from the placement of the international dimension in the strategic plans of a public university such as Iowa State University? The very first page and very first paragraph of ISU's Strategic Plan in the section of Land-Grant Heritage and Values states the following:

> Iowa State University is an internationally prominent university that seeks to become even better. Iowa State's aspiration to be the nation's premier land-grant university is closely linked to the university's historical and continuing mission as Iowa's land-grant university.

The third paragraph continues with, "Iowa State University embraces its land-grant heritage and responsibilities with an institutional orientation toward science and technology." It proposes to build on the synergy between the university's "tradition of strength in science and technology" and the liberal arts and social sciences in order to "become even stronger and more distinguished in its teaching, research, and outreach efforts."

The relative importance of information technology -- one of the six primary goals -- is not surprising in light of this institutional orientation:

Goal 1. Strengthen undergraduate teaching, programs and services

Goal 2. Strengthen graduate, professional and research programs

Goal 3. Strengthen outreach and extension efforts

Goal 4. Strengthen and enhance an intellectually stimulating environment and a supportive university community for all students, faculty, and staff

Goal 5. Establish international leadership in the integration and effective use of information technology and computation services

Goal 6. Strengthen initiatives to stimulate economic development, with a special emphasis on environmental stewardship and enhancing human resources and quality of life

None of the six goals is explicitly internationally-focused, although a Council on International Programs (CIP) representative to the university-wide strategic planning committee helped infuse international dimensions into the six goals more than might have occurred otherwise. Four of the six goals have international subcomponents, and increasing internationalization is one of nine cross cutting university-wide strategies for achieving the six goals. However, technology-related goal subcomponents are also common and three of the nine strategies are technology-oriented: understanding the implications of science and technology, expanding technology transfer, and using information technology and computation services.

CIP Grants

ISU's Council on International Programs (CIP), constituted in 1993, consists of faculty representatives from each college and the library; the director of the Office of International Students (ex-officio); the Associate Provost, who serves as chair; a joint appointee from the Study Abroad office with publicity-related assignments; and a part-time time faculty intern providing staff support (the author of this paper). In one of its first actions, CIP distributed $100,000 in international seed grants to ISU's colleges. Of the seven grants awarded in year 1 (Table 1), only one had a clear technological focus. In successive years, as the seed grant program shifted to a process of competitive proposals evaluated according to the extent to which they further the "globalization" aspects of ISU's strategic plan, the influence of the plan on the themes and orientations of proposals submitted became most marked in the area of communication technology. None of the other goals figured as prominently; in fact, one goal (outreach and extension) did not figure in any CIP proposals or awards.

Implications

Does this technology-focus bode ill or well for internationalization/ globalization? A Research Agenda for the Internationalization of Higher Education in the United States (1995) refers to technology in three places. On page 23 it reports that "Outreach through the Internet was alluded to but not discussed in any detail;" on page 32, it asks: "Do modern communications technologies offer relatively unused, potentially effective

Table 1. Technology oriented proposals funded across funding cycle

Funding Cycle	Name of Proposals Funded	Percent focused on technology	
		Submitted	funded
Year 1 1994-95	Internet Exchange Project	7	1/7 --.-%
Year 2 1995-96	Internal Internship Program for Strategic Global Technology A Global-Change Course on the Internet for Graduating Seniors A New Model for International Library Cooperation	20/40 50%	3/8 37.5%
Year 3 1996-97	International Development and Delivery of On-Line Courses Enhancement of a Virtual World Wide Web Reference Library for International Scholars in Science and Education International Development and Delivery of On-Line Courses Library Support for International Programs	9/18 50%	3/7 42.9%

opportunities?; and on page 15 suggests to "look at the internationalization of communication within scholarly communities or scholars' interaction with practitioners."

Obviously, the Internet allows for direct international connections without physical relocation. In the CIP-funded Internet Exchange Project, an initiative linking U.S. and south East Asia (reported in Table 1), Bradshaw (1996:99) demonstrated that students and faculty sharing expertise and equipment could generate a three-dimensional model at one site based on computer-assisted drawings completed at the other. This was the first use of the Internet for many of the U.S. students, and their first contact with people from other cultures. Bradshaw concludes that outcomes extended beyond the classroom enabling students to see themselves and others in a global context.

Another ISU effort, an e-mail-facilitated high school science exchange program called SciLink, involved joint science projects with Moscow, Russia. The 162 high school students and 19 adults involved in SciLink shared teaching materials and methodologies, jointly produced scientific data, and visited to each other's countries. Glass (1996:99) reports that data from 181 persons indicate that international exchanges can promote the development of cultural understanding and improve science achievement. He concludes that science, as an international language, is an excellent vehicle for promoting international understanding.

El-Khawas (1995:55) sees the ease of electronic communication creating a stronger incentive among faculty to overcome the physical constraints on international collaboration and to develop strong working relationships with distant colleagues.

Technology creates new global networks of scholars whose access to each other and to all sorts of information is unmediated by traditional institutions, whether colleges and universities or print publications (p. 7). This "disaggregation of institution-based knowledge" (Scully, 1995:4) not only frees both students and scholars, but also changes the rules according to which traditional institutions operate.

Hawkridge (1996:4, 10) helps cast this discussion at a broader plane by asking if three major trends – globalization, electronification, and commodification – will lead to domination or liberation. He argues that "As globalization proceeds, students will cross international boundaries, virtually if not physically in larger numbers." Globalization will push educational technologists to design, test and make knowledge products and services. Electronification will aid this process and result in a more capital-intensive educational technology. Teacher and students will extend their senses, intellectual reach and international understanding, by virtue of the electronics at their command. Commodification of education technology, riding on the back of globalization and electronification, will increase rapidly and create a huge global market in knowledge products. This market is likely to be dominated by the English language and by the U.S. which controls a great deal of the hardware and software, as well as the knowledge products.

Hawkridge encourages the new educational technology practitioners to avoid an objective and value-free sounding rhetoric. He suggests that they instead consider how their participation in globalization, electronification and commodification leads to domination or, by opposing the hubris of intellectuals and power relations that underlie the formation of knowledge (in the manner articulated by Popkewitz, 1990), to liberation.

Web pages

One of my objectives was to examine ISU's home page to determine its relationship, if any, to the strategic plan and its effectiveness in advancing international programs at ISU. Bluntly put, ISU's home page shows little, if any, congruence with the strategic plan and fails to mention international. Among ISU's peer institutions, only Michigan State University and the University of Illinois include the word international on their home pages (Table 2). First order links to computing-related resources appear much more often. Direct links to the alumni association is a characteristic shared by a number of our "peers" including the four omitted from Table 2 (Ohio State University, Purdue, University of Minnesota-Twin Cities, and the University of Wisconsin-Madison).

Table 2. Home page content of selected peer institutions

Institution	**First Level Links to International Programs, Computing, Information or Communications Technology, and Alumni**
Michigan State	• Alumni, Outreach, MSU Extension, International Programs • Information Technology: Libraries, Computing and Technology, Other WWW Gopher
Illinois-Urbana-Champaign	• Resources & Services: Libraries, reference, publications, administration, computing, offices, employment, international programs, student resources, health services, outreach and external programs, continuing education, public service, procedures manuals, central stores ... • Classes via the web/Software/Gopher/Web Publishing
Arizona	• Reaching out – Taking the University outside the campus. Information on Co-operative Extension, the Alumni Association, the development Office, and more
California-Davis	• Outreach: applied research, continuing education and other services to the community
Texas A&M	• Community/Regional • Computer/Computing • Engineering/Technology • People/Contacts/Alumni
NC State	• Outreach, Extension & Continuing Education • Computing Resources
Iowa State	• Alumni Association • Computing

Limbird (1995:27) encourages viewing the concept of international advancement as favorably presenting "an institution's international strengths and potential to its often overlooked consituencies of alumni and friends." Viewed in such as way, ISU's home page is disappointing. Only one institution, Michigan State University, organizes its home page in a functional manner that implies (to this author, at least) an understanding of the functional relationship between international, outreach, extension and alumni programs. Several others come close.

Conclusions

The extent to which planning documents, and their latter day incarnation in world wide web pages, actually mirror empirical reality (v. rhetoric), and can thus be used as a basis for cross institutional comparisons, remains unanswered. In describing his efforts to make sense of grants programs for encouraging internationalization, Stempel (1996) describes how an exercise comparing apples and oranges turned into one comparing apples, olives and potatoes: "they are vaguely similar and serve a common purpose, but there's no real way to combine them into a compatible mixture." A successive, comparative, multiple case study research design (as described by Robert Yin in Case Study Research: Design and Methods) might be one way to broaden the applicability. Such an approach would begin with a proposition and, through a process of analytical -- rather than statistical -- generalization, reach conclusions.

My intent is not to indict information or communication technology. Indeed, my own international work in Lithuania and Belarus has been aided enormously by simple direct distance dialing and electronic mail. The potential danger is that when technology becomes an end-in-itself, distance communications may replace – substituting for rather than supplementing -- face-to-face human relationships. Why, asked one CIP member during a discussion of foreign language technologies, are video technologies seen as a boon to internationalization on our campus, when at any time we could go to the student union and interact with foreign students, but fail to do so? Might our goal not better be making technology work for international programs, and internationalization in a broader sense, rather than globalization in the more narrow sense as end-in-itself?

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Attitudes Affecting Peruvian Farmers' Choices: The Influence of Selected Factors

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INTRODUCTION

In the recent past Peru's Central Highlands has been home for the terrorist group called "Sendero Luminoso" (Shining Path). Many people were slaughtered and villages devastated by both government and terrorist violence. During this time valuable knowledge, culture, traditions, and conventions related to agriculture were lost. Thanks to these political events, local agricultural customs are in turmoil. The Central Highlands is now in the process of mending damage to agricultural lands and crops.

Anthropological studies have shown that even in traditional societies, agricultural production involves choices and decisions. Farmers' choices result from the interplay of different variables in which access to resources from the natural environment interacts with the social environment to determine the scope of available options (Bartlett, 1980). Studies of small farmers' choices and agricultural decision making have tried to simplify rather complex processes of evaluation of options in order to predict and/or understand behavior. Gladwin's (1979; 1980), anthropological perspective focuses on the description of the selection process. She suggests that decisions are based mainly on a process of comparison of alternatives in which inappropriate options in terms of cropping constraints and conditions, are eliminated by farmers.

Decision making processes are influenced by the information farmers have about agricultural factors as well as by food consumption patterns and preferences. Nazarea-Sandoval (1995) proposed that differences in resource allocation and management among households are a function of diverse socioeconomic and ecological constraints. In addition, she pointed out that the social distribution of indigenous knowledge is uneven but patterned with different socioeconomic and gender categories. Nazarea-Sandoval (1995) says that this distribution shows different ways of understanding the environment, and thus, leading to different courses of action. These can be demonstrated in the processes of soil and/or crop manipulation as differentiated between sexes. Women farmers, in San José de Arizona, tend to nurture the soil with more care than do their counterparts. The men seem to do what is needed at that particular field and at that particular time.

Farmers in San José de Arizona, in the Central Highlands of Peru, have had to make decisions concerning crops to be cultivated, and adjustments to their current farming practices. Decisions such as what to plant and for what reasons, whether they be for consumption or for market. Because of the past decade's terrorist activities, farmers have had to make decisions based upon the survival of their families. These decisions have affected the traditional farming techniques and the cultivation of historical and traditional food crops. This study examined factors--internal to the culture (i.e., traditional farming techniques) and external (i.e., government policies) which influence the decision making process.

Agricultural Family Production

Schejtman (1980), along with others, has pointed out that "the peasant unit is at the same time a unit of production and a unit of consumption where household activity is inseparable from production activity" (Deere and de Janvry, 1979; Goodman and Redclift, 1982; Brignol and Crispi, 1982). Domestic activities are confounded with the productive activities carried out by the family. Thus, the subsistence of the family farm results from the combination of the decisions in both dimensions. The main resource for the development of all activities is the availability of family labor from which family income derives (cash and in-kind income).

The organization of the household is based on the division of labor according to sex and age. Deere and de Janvry (1979:60) have described this pattern for Cajamarca, Peru in the following terms:

> "Mothers, principally assisted by daughters, carry out the myriad of activities which are required to reproduce familial labor power on a daily basis. But women also play an active role in home production activities. In the majority of households, women are charged with animal care in addition to agricultural processing and artisan production. Men, in contrast, are the principal agriculturalists. In the majority of households that participate in the labor market, fathers and/or sons are the wage workers. However, commerce is an off-the-farm activity that is generally in the female domain."

The articulation of all activities performed by the family and their interdependence may be understood with the concept of a farming system. The systems approach as a holistic perspective was first used in the biology field and further extended to other areas of scientific research (Hart, 1982). A farming systems approach views the farm as a comprehensive unit integrated by different interrelated elements. The unit is also included in a regional agricultural system that defines the total environment in which the farming system operates. Hart (1982:46), defined a farm system "as a set of spatially definable areas in which either crops, animals, or both are produced, and a homestead area in which the farmhouse is located." Two main components of the farming system can be distinguished: an agroecosystem composed of physical and biological factors that provide the conditions for the farming system to exist (Norman and Gilbert, 1982), and a socioeconomic system that is the arena of the family farm in which the economic transactions and management decisions take place (Hart, 1982). The human element, which provides the sufficient conditions for the farming system, was further divided into two groups of factors by Norman and Gilbert (1982). Exogenous factors such as community structure, norms and beliefs, farm location, markets, etc., are outside of the control of the individual household; and endogenous factors such as land, labor, capital and management are governed by the farmer's decisions (Norman and Gilbert, 1982: 19).

Gladwin and Murtaugh (1980) focused on the distinction between processes based on routine information processing (preattentive) from those that require calculation and conscious manipulation of information (attentive). Other studies used models based on images and meanings that farmers develop about their operational reality (Nazarea-Sandoval, 1995) for investigation of the logic of production.

Andean Communal Agricultural Production

Andean families use diversification of activities as a strategy for subsistence through combining agriculture for subsistence, agriculture for sales, and participation in labor markets. Gonzales de Olarte (1984) and Collins (1986) have suggested that the diversification of activities constitutes a risk-mitigation mechanism by which families try to provide an adequate living for their members. In this way, they participate in different forms of production that provide the means of survival to their families without having to abandon family farm agriculture. As in the village of San José de Arizona, families make a living in agriculture and are mainly subsistence farmers. They combine the production of several crops with cattle raising activities in order to meet their daily needs. Production is mainly organized at the household level, but farmers also maintain communal plots and animals that are owned and managed by all members of the community as a group.

Interplay of Andean Community and Family

Economists, sociologists, and anthropologists concerned with the Andean peasantry have analyzed the articulation between family and community. Families are the basic units of the Andean communities. Related by consanguinity and affinity, families live and produce in a common territory. According to Gonzales de Olarte (1984), Andean production results from the combined activities of peasant families operating in the frame of a communal organization. He has also highlighted the communal organization as a distinctive aspect of the organization of production. Gonzales de Olarte affirms that there is a communal economy when the organization of production occurs in such a way that an interrelationship among families produces a "community effect" which is defined as a group of economic benefits, which differs from those individual families would obtain by themselves. Placing ecological diversity as the basis for a complex social organization, a community is defined as an organization of poor country people which constitutes a strategy for survival in a context of limited resources (this includes the diversification of production, management of different production zones and biological cycles). The peasant's family is the basic economic unit, for consumption and production (also described in the same terms by Figueroa, 1984) in which most economic decisions are made in accordance with the rest of the families in the community. The communal economy also operates as a redistribution mechanism weakening the process of differentiation between better off and worse off families.

Regarding the control of resources, families usually decide over and manage the individual arable plots as well as the capital goods, the allocation of resources and labor. Animals belong to individual families, but pastures are collectively owned by the whole community (Figueroa, 1984; Golte, 1980). Families also make the decisions of what to produce, how much, and on what plots. Some other resources such as natural pastures and water sources remain under communal control and are managed through collective decisions.

Most communities are characterized by a high proportion of individual assets of land, unequal land and cattle distribution among the families, and a communal organization of the work and management of resources. Production relationships inside the community are three: family oriented, community oriented (including mutual work and collective tasks), and salary oriented, in exchange for money or payments in kind. According to these types of relationships, the territory is organized in three ways: production on family plots, shared production in which farmers with less or poorer land get access to better plots, and communal production in collective plots.

In a similar vein, Flores Ochoa (1985) emphasizes the network system among communities in the Department of Cusco as a strategy to obtain a broader range of agricultural products. Based on the concept of verticality, Flores Ochoa studies the relationships among peasant communities from different altitudinal levels. Since communities usually only have access to products of one or two ecological zones, they have developed relationships with other communities in different locations. In this respect, he also stresses the continuity of major characteristics of the peasant system from the time of the pre-Hispanic period. "The communities keep on functioning in terms of relationships based on exchanges of agricultural products" facilitated by the close proximity of ecological regions. Thus, "through interaction and complementarity communities manage to obtain goods for daily consumption which they do not produce" (Flores Ochoa, 1985: 272, 273).

The exchange of products is complemented by the weekly market which is important for peasants to acquire the goods which are not produced in the countryside and other rural regions. However, Flores Ochoa considers that "the market system and market places are secondary and even peripheral to the peasant economy" (1985: 274). On the contrary, other authors have attributed an increasing importance to the contacts between the communities and the markets. Gonzales de Olarte (1984) considered that the integration of the peasants into the national economy occurs via different spatial articulations: through the communities, through the micro regional markets, and at the regional markets. He classified peasant communities as non-capitalist but mercantile forms of production which are integrated into the capitalist national economy through market production. In a context of expansion of the market economy, all families in different proportions, get cash as a result of selling either agricultural products (that they do not consume) or their own work which they utilize to buy different industrial products: matches, candles, rice, noodles, bread, sugar, clothes, etc. Through these mechanisms, they are integrated into the larger economy. Some other authors have suggested that there is increasing pressure on peasant economies for a more intensive participation in cash activities which at the same time threatens subsistence agriculture and demands the persistence of communal frames in order to secure production (Collins, 1986). In addition, Fano and Benavides (1992) have suggested a tendency toward the predominance of one or two crops determined by the market which are increasingly grown on more and better quality lands within the communities.

Fonseca (1988) discovered processes of farmers' differentiation in different Andean communities which are based on the manipulation of reciprocity relations by better off farmers who accumulate personal prestige and wealth over the others. This differentiation concerns social inequalities and distribution of ecological resources (Bernstein, 1982; Blum, 1995) affecting the social mobility of peasant families. The asymmetry of relations within communities does not lead to the destruction of the peasantry (Durston, 1982), but it consolidates its division into disadvantaged and benefited groups. Montoya (1982) suggests that the principal basis of the difference between better off and poor families is to be found in commercial activity, transport services, and ownership of a greater quantity of livestock by particular families. According to Montoya, income from these activities gives families a higher standard of living and more possibilities for educating their children, but still does not alter their condition as family producers.

Other authors have identified different processes based on the articulation of farmers with the market economy which result in differences in terms of social relations of production. Deere and de Janvry (1979) found that farmers' access to the means of production in Cajamarca determines their class differentiation into either wage workers or commodity producers (also described in Caballero, 1984). That is, families with insufficient land tend to move into the labor market as permanent or temporary laborers, while households with more or better resources tend to integrate into the circles of commercial farming. In cases of semi-proletarianization of family members, income from outside the family unit, (specially from migratory sources), is incorporated, which is fundamental for the survival of the peasant family (Durston, 1982). Further, Collins (1986: 655) emphasized the permanent mobility of the Andean families. She argued that a single household may be "peasant, proletarian, migrant, or cash-cropping small farmer" during its life cycle. This fluctuation in roles results from the diversification of strategies Andean families utilize in the context of an erratic development of capitalist relations in the Third World.

Indigenous Crops and Knowledge

Scholarship on indigenous crops is generally associated with indigenous knowledge and biodiversity conservation efforts. Indigenous crops are indeed a reflection of the local knowledge unique to a given culture. In turn, indigenous or local knowledge constitutes the information basis of a society which is central to the processes of communication and decision making among its members (Nazarea-Sandoval, 1995). Indigenous knowledge is clearly defined by Gadgil et. al., 1993: 151, as a "cumulative body of knowledge and beliefs handed down through generations by cultural transmissions about the relationship of living beings, (including humans), with one another and with their environment." Bebbington (1994: 93), highlights the dynamic nature of indigenous knowledge remarking that it "is constructed through the socioeconomic and cultural histories of the region." Local knowledge reflects "the range of aspirations, values and preferences that rural people have." Therefore, this type of knowledge includes a combination of a collective, socially constructed know what, know how, and know why about locally adapted crops and the particular characteristics of the environments in which indigenous groups are located. From here then, comes the articulation of local knowledge and biodiversity related topics.

After the recognition of the fact that local people are knowledgeable about the crop varieties that they grow and that in particular small farmers are keepers of diversity, research has been conducted about indigenous crops and knowledge in different parts of the world. As Prain (1993) points out though, most studies have concentrated on the genetic makeup of varieties and on the cultural, socioeconomic and ecological characteristics of the plants' environments. Fewer studies have focused on diversity and its associated indigenous knowledge addressing the relationship between cultural practices and crop diversity. Since crop diversity is a function of both ecological conditions and human actions, the collection of genetic information needs to be done in combination with the study of the agricultural practices of the native populations.

Resource poor farmers practicing agriculture in difficult environments such as in the Andes, often maintain genetic diversity as a strategy for meeting different needs. For this purpose, they have developed skills for identifying and evaluating the crop varieties which are most suitable for their farming systems. This process involves experimenting with native and introduced varieties as integral parts in a wide pool of genetic resources which promote stability of production, a diversified diet and income source, and an efficient use of labor (Montecinos and Altieri, 1992). Diversification is therefore, a strategy for subsistence.

Nevertheless, as Salas (1994: 62) remarks "indigenous knowledge is local and specific, being impossible to establish a pattern for the whole Andean region. Indigenous knowledge survives in the experiences and practices of peasant families. It is embedded in local culture and society and molded with symbolic and material actions and attitudes towards nature."

PURPOSE AND OBJECTIVES

The purpose of this study was to understand the agricultural practices related to changes made and to identify the internal and external factors that influence the decision making processes of farmers from San José de Arizona. The following objectives were developed to guide this investigation.

1. Identify the internal and external factors which influence decisions made by San José de Arizona farmers regarding their farming practices.
2. Determine whether internal or external factors have more influence on decisions made by San José de Arizona farmers regarding their farming practices.

The study employed five phases: 1) a review of literature, 2) adoption of a research instrument (survey/questionnaire), 3) purposive sampling of farmers for the study, 4) administration of research instrument, and 5) the analysis of data.

This study integrates the qualitative method of analysis. The major part of this study is based on the analysis of qualitative data collected in the community of San José de Arizona by means of a survey. Therefore, given its interpretative nature, qualitative inquiry is an appropriate methodological approach for the purpose of studying farmers' actions and circumstances in San José de Arizona. For this reason, the main part of this research, that focuses on farmers' rationale for their agricultural practices, is based on qualitative forms of data collection and analysis.

HYPOTHESIS

Farmers in the Central Highlands of Peru, specifically in the village of San José de Arizona, make decisions influenced by internal factors rather than by government, non-governmental organizations, and other external factors.

METHODOLOGY

The Qualitative Approach

The qualitative method approach utilized in this study is known in the literature as naturalistic inquiry. Patton (1990) defines the purpose of using qualitative methods as the understanding of naturally occurring phenomena in their natural settings. Unlike experimental approaches, qualitative designs are naturalistic in that the researcher does not attempt to manipulate the research setting. Accordingly, the mandate of qualitative methods is to go into the field in order to get close to the subjects and learn firsthand about the situations and realities under study.

> "Qualitative methods are particularly oriented toward exploration, discovery and inductive logic. [An approach] is inductive to the extent that the researcher attempts to make sense of the situation without imposing preexisting expectations on the phenomenon or setting under study. [...] A qualitative methodologist attempts to understand the multiple interrelationships among dimensions that emerge from the data without making prior assumptions or specifying hypotheses about the linear or correlative relationships among narrowly defined, operationalized variables" (Patton, 1990: 44).

The previous quotation synthesizes the idea that the research team had in mind when it went to the community. Following the logic of an exploratory, discovery-oriented design rather than a verification-oriented design, the team entered the field with no theory to prove and no predetermined results to support. Consequently, two traditional sociological techniques of data collection (described in the following section), were chosen for the study, which required the immersion of the research team in the field. This strategy enabled the researchers to describe and understand the circumstances in which externally observable behavior takes place as well as more internal conditions of the peasant families which are often reflected in their opinions.

Data Collection

Primary data collection was conducted in San José de Arizona by three Penn State students and one student from the Universidad Nacional de San Cristobal de Huamanga, (UNSCH), from May 15 to June 15, 1996. Families, informed by local counterparts in the research project, were aware of the development of the study prior to the arrival of the research team in the field.[1] A general meeting among community leaders and residents, foreign researchers, and local scientists took place the day of the first visit to the community. A local anthropologist at UNSCH who had previously researched and lived in the village, was in charge of the presentation. During the meeting, the purpose of the study and the activities planned for the fieldwork were made explicit to the community which agreed to cooperate with the project. This strategy is called by Patton the "known sponsor approach" according to which researchers use the legitimacy and credibility of another person to gain access to the field (Patton, 1990). In this case, the confidence of San José de Arizona residents in the local anthropologist smoothed the entrance of the foreign researchers to the community.

The research team was limited to a specific time frame, therefore, the whole community could not be surveyed. During the first phase of data collection, the research team attempted to make appointments with the families, but soon realized that approach was not appropriate. Instead, residents were interviewed on the basis of their time availability and willingness to talk. Usually this was accomplished after the research team had helped the farmers harvest their crops. This facilitated the interview process during a brief break or lunch during the day.

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[1] Part of the research team had visited the community previously on several occasions to determine if they were interested in participating in the project.

While fieldwork activities developed without major constraints in the collection of data, some obstacles should be mentioned. One of the limitations was that of language. Although interviews were initially conducted in Spanish, which is the second language of San José de Arizona residents, language represented a barrier to the interaction of the researcher with particular residents (women) who did not all speak fluent Spanish and would either speak only Quechua or constantly switch from one language to the other during conversations. In addition, because the researchers did not speak any Quechua they were still considered outsiders by some of the residents at the end of the fieldwork time. Being able to communicate with the farmers in Quechua would certainly have enhanced the understanding of the farmers' experiences, however, since the principal intention was not to record feelings and perceptions, but mainly facts and opinions about their practices, the language difference was not considered a critical obstacle for data collection. Likewise, the one local student helped the Penn State team in translating some of the conversations in the field from Quechua to Spanish.

Another limitation in the data collection was the inability of the researchers to start analyzing the data before leaving the field. Even though data processing was initiated somewhat at the research site, the analysis of the information collected did not start until the team returned to the U.S. Consequently, they did not have a thorough understanding of missing points in the data until the data collection phase was already finished.

Interviews and Observation

As already mentioned above, fieldwork activities were conducted in San José de Arizona during the summer of 1996. Semi-structured interviews (Patton, 1990) were conducted with 40 farmers. The data collected included socioeconomic information for each family (family composition, crops, product destinations, etc.). The selection of this instrument allowed the researchers to focus the interview on a list of information that was needed from each interviewee according to the research questions. The focus of the interviews was determined in an interview guide containing the issues to be explored. Since the interest of this research is not only on the holistic view of San José de Arizona, but also on the individual households as comparable units of analysis, basically the same information was obtained from each respondent. Even though each family was asked essentially the same questions, the particular phrasing of questions and their order in the conversation were often redefined according to the particular characteristics of each respondent and to the course each interview took. As stated by Denzin (1978), an assumption underlying this type of interview is the recognition that different individuals have different ways of defining their world, and thus, researchers need to take into account their different perspectives in order to convey meaning. Therefore, the team did not find a unique, most effective wording and sequence of questions to approach all respondents. In addition, given the rather limited previous experience of the students in working with peasant communities, a flexible style in the data collection instrument was preferred in order to allow the emergence of aspects possibly missed by the researchers. The semi-structured interview also allowed the respondents to raise issues not previously considered in the interview guide.

Due to cultural constraints, the research team was unable to tape record the interviews with the farmers. Therefore, notes were taken during the conversations in the field and later transcribed and classified by topics in thematic formats to facilitate the analysis. In addition, a few interviews were translated from Quechua to Spanish with the help of the local student.

Direct observation in the field was the second data collection technique utilized in San José de Arizona. Field notes containing general information about the community and supplementary data on selected households were taken throughout the stay in the field. Field notes from direct observation are mainly descriptive and contribute to a better understanding of the social setting. As described by Patton (1990), one value of observational data is the fact that the researcher may have the opportunity to see things that may escape from an interview because daily routines are often taken for granted by the interviewees. However, an observer who is not personally involved in the situation may become aware of them. In addition, the researcher can learn about things that the respondents may be unwilling to talk about or provide accurate information. Therefore, observation enables the researcher to get information that otherwise would not become available. An example of the utility of observation is the fact San José de Arizona residents were not likely to report the exact number of cattle they own. However, the team was able to at least estimate the number of animals when they saw them being driven to the upper lands for grazing.

At the end of the day in the field, the researchers shared notes in order to write the answers to the interview guide on the original thematic formats and discuss the information collected from observation. This procedure was used as a cross checking technique in order to minimize errors in data collection. In addition, this researcher kept a daily record of transactions and activities for further analysis. In sum, the combination of both techniques of data collection plus the constant interaction among the members of the research team helped them to get a more comprehensive view of the situation in San José de Arizona.

Data Analysis

Data collected in the field will be analyzed using SPSS-PC program utilized by the Department of Agricultural Economics and Rural Sociology. The data were analyzed to understand the relevance of changes in farming techniques and causation, to the social and cultural significance of decision making to the farm family. The data were added to a database by students whose assistantships included these duties.

FINDINGS AND/OR CONCLUSION

Findings indicated that there are several internal and external factors influencing the decision-making process of farmers in San Jose de Arizona. The internal factors included: customs, family and communal traditions, and historical events, etc. The external factors included: technical assistance from universities, non-governmental organizations and the government itself. It appears that external factors, especially technical assistance, brought about significant changes in the farming practices. These include changes in planting techniques, seed selection, and cultivation techniques. In addition, external factors in the form of technical assistance also increased the use of pesticides, chemical fertilizers and improved seeds. A list of internal and external factors, ranked according to their influence on decision making, was developed.

Fifty-five percent of the respondents said that they made changes in their agricultural practices. Of those fifty-five percent, 22.5% had changed their planting techniques. Those techniques adopted such as row position, what crops to associate and the use of chemical fertilizers and pesticides were suggested by various NGOs, Universities and Governmental agencies. Seed selection, based on size, personal preference, and appearance ranked as an internal factor. This was a practice passed down from generation to generation. Decisions as to what to farm was based on land availability, seed access and a minor percentage in other issues.

Based on the findings, the hypothesis stated was rejected. It seems external factors play a larger role in the decision-making processes of farmers in San José de Arizona than do internal factors. It can be concluded, because of the civil strife during the past decade and the loss of valuable agricultural knowledge, recouping of agricultural practices and lands used for cultivation has met with more intervention by NGOs and technical assistance from universities and grassroots organizations. In other words, internal factors such as the selection of what crops to plant have a limited role or influence in the decision-making process. It appears that external factors such as changes in planting techniques, use of improved technology in terms of seeds, fertilizers and pesticides, influence the decision making of farmers to a greater extent.

EDUCATIONAL SIGNIFICANCE

The educational importance of the study is to understand the community of San José de Arizona, its needs, and the educational approaches to appropriately address those needs. Field based research methodology has been developed which has the potential for use in other settings. The necessity of safeguarding indigenous knowledge, which has been passed down from generation to generation, is a major concern. But, how people in this community have adjusted to the changing situation needs to be examined.

The findings of this study have provided a basis to identify and understand factors influencing decision-making processes of farmers. The conclusions achieved in this study offer potential for international agricultural and extension educators in other settings similar to San José de Arizona.

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Session C

Rural Development

Session Chair - Dunstan Campbell
Kennedy Room

TITLE: China On the Road to Unsustainability: Agriculture and Natural Resources in the Northwest
AUTHOR: William M. Rivera, University of Maryland
DISCUSSANT: Larry Miller

TITLE: The Opinion of Women about a Rural Development Program in Northern Potosi, Bolivia
AUTHORS: Pilar Lopez, Solange Angel, Edward Ruddell
World Neighbors, Santiago, Chile
DISCUSSANT: Larry Miller

TITLE: Educational Change in China: Making the Market System Work
AUTHOR: Thomas H. Bruening, The Pennsylvania State University
DISCUSSANT: Arlen Etling

TITLE: Self-Perceived Professional Competencies Needed and Possessed by Agricultural Extension Agents in The Fars Province of Iran
AUTHORS: Mohammad Chizari, Tarbiat Modarres University
Ahmad Reza Pishbin, Tarbiat Modarres University
James R. Lindner, The Ohio State University
DISCUSSANT: Arlen Etling

ONE FOURTH OF CHINA ON THE ROAD TO UNSUSTAINABILITY: AGRICULTURE AND NATURAL RESOURCES IN THE NORTHWEST

William M. Rivera, University of Maryland, College Park

China's economic reform is creating a new superpower, and a new generation of entrepreneurial Chinese is emerging (Kristof & WuDunn 1993; Overholt 1993; OECD 1996). Nonetheless, caution needs to be sounded at this time of enthusiasm about China's rise to power.

One note of caution regards that sector of China's economy which feeds its people, fuels its exports, and provides employment to some 40% of China's 16 largest cities: agriculture. In this instance, the findings refer to one area, the Northwest, which covers three provinces: Gansu, Qinghai and Shaanxi and two autonomous regions: Ningxia and Xinjiang.[1] The Northwest has had common commercial interests for a thousand years; this is the region still known as the Silk Road.

The subsequent findings were gathered around a one-month evaluation mission of an international multi-project program in NW China, and are based in part on the on-site observations I made during that mission. These findings highlight a serious concern: the likely unsustainability of agricultural development and natural resources, especially soil and water, in NW China. The implications of this scenario tend to support the concerns of those who suggest that China in the foreseeable future may be unable to feed itself (Brown 1994; Huebener 1995).[2]

I argue that agriculture, which represents about 21% of China's GNP[3], is unlikely to be sustained at its present rate of development. The argument is based on the agricultural conditions and circumstances that currently prevail in Northwest China, namely: (1) the arid and semi-arid condition of the land itself and the agro-production constraints in the Northwest; (2) the development of the wrong agrotechnologies if sustainability is to be pursued; (3) the lack of a development orientation in the region -- politically, institutionally and technically; (4) the under-development of human resources and professional staff and the general lack of institutional capacity in the Northwest; and (5) the failure of government policies, such as subsidies for chemical inputs to farmers, inputs that are a drain on government coffers and destructive of agricultural land and water resources. To set the stage, I begin with a review of three possible scenarios for China's future.

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[1] Autonomous regions have more power to determine their own policies than do provinces.

[2] For a discussion of Brown's paper, see the American Association for Chinese Studies (AACS) articles on "Population, Food and Energy in China." Bulletin, vol. 23, no. 1, June 1996, 16 p. -- Articles by Erland Heginbotham, Lester R. Brown, T.C. Tso, and Wang Zengrong.

[3] The World Bank; The World Bank Atlas, 1995, p. 18, Washington, DC.

Possible Scenarios

Ordinary Chinese have caught the get-rich-quick bug. It seems that everybody in the nation is running businesses: quanmin jieshang. China has awoke and is rising to an impressively high economic level; its economic boom is beginning to reshape the economics of Asia as China becomes one of the world's major trading powers. At the same time military, economic and human rights issues plague its relations with the United States.

Contemporary authors remark the rise of China and how its economic reform is creating a new superpower (Kristof & WuDunn, 1993; Overholt 1993; Schell 1994). The Chinese economic takeoff that began with the implementation of Deng Xiaoping's 1979 economic reform plan is impressive. Its growth rates fluctuate between 9 and 13 per cent annually. The Economist's Emerging Market Indicators for 1996 cite the following figures:

Figure 1 -- China's Emerging Market Indicators for 1996

GDP	Industrial production	Consumer prices	Trade balance	Current account	Foreign reserves $BN
+9.5%	+13.2% (Jun)	+8.5% (Jun)	+4.3 (Jun)	+16.5 (1995)	83.7 (61.4 yr ago)

But this new economic superpower also troubles some like Lester Brown whose concern is expressed in the question posed in the title of his 1995 book, "Who will Feed China?" Others, like Brown, view China's growth with a certain alarm, like Huebener (1995), who on examining China's agricultural system, suggests that it is on the edge of no return. But whether one is bullish or bearish on China, the fact of its current growth rates -- over 12% in recent years -- is enough to keep economists alert to its development, a significant part of which will depend on the development of its agriculture sector -- including crops, livestock, forestry and fisheries.

Meanwhile, some 40 million people live in caves in China's Northeast. In the Northwest, which makes up about 25% of China's territory with a population of 76 million, many are still poor and 16 percent belong to minority nationalities. The people in 520 of China's 1,903 counties have annual incomes below US$35 per person.

Thus, there is always the possibility that an entirely different scenario might emerge, that China's future could go in another even more radical direction, experiencing internal chaos and splintering into ethnic minorities and/or linguistic enclaves.

China's internal preoccupations include tensions in Tibet, Xinjiang and elsewhere, not least in Beijing itself. These political tensions and widespread rural poverty could prove a major underlying cause of political unrest, and one which has led to mass rebellions in China's past. Uneven economic development has also encouraged the emergence of rival regional power centers, such as Guangdong and Shanghai.

Critics insist that unless complementary political change is forthcoming, conomic reforms will sooner or later flounder (Schell 1994). Without a system that makes the government accountable to the people or guarantees orderly political succession, China will never attain the level of political stability needed to sustain long-term economic growth.

Population growth with a ground base of 1.2 billion will continue to put a tremendous burden on government to feed its people. As Lester Brown suggests, China may soon emerge as an importer of massive quantities of grain -- quantities so large that they could trigger unprecedented rises in world food prices. Meanwhile, I would argue, too much attention is paid to grain production and not enough to poverty alleviation and agricultural sustainability -- more specifically, to farmers' needs and the land's needs.

In short, China in the next 20 years could easily go one of three different ways. It could, as many are now predicting, become the economic dragon among the Asian tigers. Or, it could be forced by political mismanagement and social unrest to concentrate on internal affairs and build up its social institutions to combat instability. China could also simply find itself slipping onto a slower growth trajectory, with a more gradual entrance into the middle-income world of high technology and economic well being.

With these introductory remarks, I return to the five above-cited agricultural conditions and circumstances that currently prevail in Northwest China, and on which the argument is based that China is on the road to unsustainability.

1. Agricultural Conditions in the Northwest

China is 58% arid and semi-arid. The semi-arid areas of the Northwest, with a maximum of 250 mm of rainfall, have mainly rainfed agriculture and support a large population of very poor families. At best, the crops are irrigated. Many of the arid and semi-arid counties are among the poorest in China and not all are self-sufficient in grain production (UNDP 1993). Ecological problems are serious: soil erosion is periodically caused by flash rainfall, and strong winds are widespread both on grazing and arable land; desertification is encroaching farmland and resident areas; salinity and water logging are already occurring in some irrigated areas; in many regions the over-pumping of wells for irrigation and industry results in a rapid lowering of the ground water table.

The Worldwatch Institute report on progress toward a sustainable society (1995), State of the World 1995, notes that: "On paper, China's government seems well aware of the resource limitations it faces, and has publicly embraced the goal of sustainable development."... "But,... there has been a gap between Beijing's rhetoric and the reality of what is going on in China's vast countryside and its now bustling cities." The report goes on to state that "China faces a big challenge in converting its green words into sustainable action (p. 130)."

Only recently has agricultural policy promised to significantly diminish subsidies for agriculture. But in the current scenario China could end up spending much of its time and money playing catch-up and hold-back, catch-up so as not to provoke further unrest among the 'have-nots' and hold-back so as not to permit further desertification and diminishment of land and water resources. Meanwhile, according to Lin, Huang and Rozelle (1996:84), government policymakers are making promises of greater investments in agriculture. At times, it appears that China's policymakers are riding a seesaw between "central planning" and "free market" approaches to development.

While a number of factors will influence agricultural production and distribution in China in the coming years (including population, income, food trade policy--on the demand side, and investments in technology and irrigation, price policy, and opportunity costs of labor and land--on the supply side), natural resources and their use will play a significant role. That is why in the Northwest, conservation and management are of such importance.

"While blessed with relatively abundant natural resources, China is cursed by their uneven distribution. Its territory is vast, like the United States, covering about 932 million hectares, or about 7 percent of the world's total land area. About half this area, especially in the northwest and west is, either arid or semiarid." (World Resources Institute (1994, p. 63)

In the Northwest any form of agriculture and animal husbandry is difficult because of extremes in temperature, aridity, and periodic drought which makes any enterprise risky. The ecology of the area is very fragile hampering any agricultural endeavor. Meanwhile, agricultural modernization runs a heavy risk of being unsustainable and detrimental to the environment. As a result of environmental marginality the region is poor and underdeveloped.

The overall situation in the Northwest is very difficult. Both the institutional and physical environments form a significant constraint on any effort at sustainable agricultural development. Farming systems are overly tight everywhere due to population pressure and raised expectations. One result is land-mining and other unsustainable practices. There is only limited scope to raise output in a sustainable manner. The one exception is the central and southern part of Shaanxi Province which tends toward being sub-humid and only partially located in the arid or semi-arid zone and has a clear comparative advantage for fruit, especially apple, production. Because of a weak physical infrastructure and very long transport distances, however, sometimes the comparative advantage, if any, is difficult to exploit.

In some cases, the solution to the developmental problem may be not to improve agriculture. Where there is little potential, as in Ningxia's Longde County, an agricultural program cannot have much impact and there will be only small returns on investment. Outmigration in the short-term, or industrialization in the long-term, is considered to be one answer (Beets, Rivera, Moore, Yang & Hu 1996).

The arid and semi-arid areas of the Northwest, with a maximum 250 mm of rainfall, have mainly rainfed agriculture and support a large population of very poor families. At best, the crops are irrigated. Nonetheless, the average annual rural income per household is RMB yuan 400 (1995 figure).[4] Many arid and semi-arid counties are among the poorest in China and not all are self-sufficient in grain production. Ecological problems are serious; for examples: soil erosion caused by flash rainfall and strong wind are widespread both on grazing and arable land; desertification is encroaching farmland and resident areas; salinity and water logging occur in some irrigated areas; and in many regions over pumping of wells for irrigation and industry result in rapid lowering of the ground water table.

Agro-production constraints are several in the arid and semi-arid areas of Northwest China. Poverty, unsustainable agriculture, environmental depletion and the unequal status of women in development are common problems that are immediately apparent. The basic needs of the poor farmers are at best being minimally met by agriculture, except for those "emerging farmers" who have planted apple orchards or other lucrative cash crops and whose incomes are three-to-four times that of poor farmers. These emerging farmers are sometimes directly assisted by researchers, often enough with research demonstrations undertaken on the farmer's land. Poor farmers, on the other hand, are already seeking to supplement their meager incomes by off-farm work in mines, factories or menial urban jobs.

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[4]. There is debate about the size of China's economy and its per capita income. Estimates ranges from US$370 to US$1,450 and as high as US$2,500. The actual value of productive capacity, per capita income and living standards is statistically under-estimated, according to Overholt (1993, p. 51-54).

Local governments also have major economic concerns about the future of increasing agricultural production; and rightly so, since industrialization would in some cases be a more rational use of land and labor. Increasing agricultural development is not possible on much of the arid and semi-arid lands of the NW region, and economic and social development might best follow the road to industrialization (Beets, Rivera, Moore, Yang & Hu 1996). There is however some debate in China about the conversion of farmland to purposes other than farming.

China's environment faces degradation on two fronts: its natural resource base, including the increasing conversion of land, and land degradation. The natural resource base is confronted with several pressing issues: particularly the declining quantity of water in the North but also the loss of forests, coastal wetlands, and wildlife habitat, the conversion of arable land to other uses and the degradation of cropland (UNDP 1993; World Resources Institute 1994).

Those alarmed about the loss of farmland, according to the World Resources Institute, point out the present dearth of arable land per capita and maintain that further shrinkage could threaten China's ability to feed its growing population. They stress that crop production is likely to become more intense and inevitably more environmentally damaging (1994, 71).

The other major threat to Chinese agriculture is land degradation. China now has about 153 million hectares of desert, nearly 16 percent of its total land area. About 5 percent of this area has undergone a natural process of desertification. The rate of desertification appears to be increasing and was estimated in 1994 at 210,000 hectares per year, up from 156,000 annually two decades earlier. Nearly 4 million hectares of farmland and almost 5 million hectares of pastureland are threatened by desertification (World Resources Institute 1994; China Daily Aug. 6, 1996).

Thus far, productivity increases have more than offset production losses due to land conversion and other changing patterns of land use.[5] What everybody seems to agree on, as the World Resources Institute notes, is that "effective land-use planning could effectively discourage conversion of the most productive farmland (p.71)."

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[5]. The FAO/UN estimates that China's cropland declined from 105.2 million hectares in 1961 to 96.6 hectares in 1990, and these numbers could be underestimated, according to the World Resources Institute (1994, 71) by as much as 20 to 30 percent. The Chinese Academy of Sciences estimates that net cropland area (including newly reclaimed land) is shrinking 333,000 hectares per year. The loss of cropland has been offset however, as the World Resources Institute notes, by an increase in double

2. The Wrong Agrotechnologies

Even within the agriculture sector, the agrotechnologies currently being developed are not directed toward sustainable agriculture and in some cases are not economically viable. Plastic film mulch, external fertilizer and pesticide inputs, irrigation without provision for future water needs -- these are impractical except of course in the short-run.

3. Lack of a Development Orientation

China appears to be on a road to increased agricultural productivity but diminishing agricultural sustainability and is failing to adequately confront and take action against the friction that will likely occur when the hard political/financial choices must be taken to ensure proper management of natural resources. Part of the problem hinges on many of the agricultural institutions in the five province/regions not development oriented[6].

For instance, research institutions possess only a small part of the data and information necessary to assess the research, developmental, socio-economic, environmental and agricultural issues and developmental needs of the area. Most institutions work in isolation and even restrict access to their data by outsiders. Co-ordination of research institutions with the Public Administration is limited and officials in provincial and local governments moreover are rarely rural development oriented. As a result, most programs are designed with insufficient information, are often based on wrong premises, and fail to address the developmental problems in question in question.

4. Lack of Institutional Capacity

The institutional environment is difficult. Most institutions are not development oriented, focused on narrowly defined research and/or administration, and favor the status quo. Human resources in the Northwest are underdeveloped and professional staff are lacking. Farmers in Shaanxi Province, one of the cradles of Chinese civilization, have been practicing more-or-less sustainable forms of largely subsistence agriculture for thousands of years. They have managed to adapt their culture, lifestyle and farming systems to the harsh physical environment, and are thus good farmers. However, in the last part of this century most farming systems have become too tight due to population pressure and the introduction of erroneous (either inappropriate or unsustainable)

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cropping and the reclamation of other areas usually described as wasteland.

[6]. Gooderham & Lund (1992) have defined organizations according to whether their training programs are determined by (1) strategic choice, where their organizational adaptation to external forces is by design; (2) differentiated choice, with low adaptation but fewer constraints than category 1 organizations (e.g., organizations subsidized by government); (3) undifferentiated choice, where adaptation measures are strictly by chance, or ad hoc; and (4) minimal choice, with high adaptation pressures, perhaps on the verge of being selected out of the industry (Gooderham & Lund 1992). Only organizations in the first category are characterized as development-oriented since they pursue "training for development", and goal-directed change is a strong feature of their operations. In China's Northwest, institutions tend to fall in categories 2 and 3.

agrotechnologies. This has led to
increasing sustainability problems stemming in large part from excessive soil erosion and over exploitation of water resources.

For the moment, the magnitude of the above problems has surpassed the ability of the region's institutions, scientists, administrators and agriculturalists to cope with them. Although there are many institutions mandated to deal with production and sustainability problems, on the whole the number of well-qualified staff is deficient. Case in point: while one of the main elements in the design of the UNDP/FAO CPR/91/110 program is "strengthening of existing institutions", there has been insufficient analysis of the dimension of the problem. The nature of staff constraints has resulted in program interventions that only very partially address the problems, such as fellowship and study-tour programs executed in other countries that expose participants to concepts and techniques that are not, or only partially, applicable to NW China.

5. Failure of Development Policies

While the Government of the People's Republic of China accords high priority to agricultural development in general, and in the Northwest of China in particular, these development policies fail, however, to fully incorporate the environmental, resource and social costs of development. As a result of inadequate policies, many practices are unsustainable, including: (a) the over-exploitation of marginal lands for grain production or grazing; (b) slope cultivation with ineffective soil conservation, causing erosion and increased incidence and severity of flood damage; (c) over drafting of ground water for irrigation; and (d) an inappropriate use of chemicals.

There is now intensive debate in China on such issues, including the drafting of China's version of the Earth Summit's Agenda 21[7]. What appears to be needed is a mixture of technical, policy measures -- particularly pricing -- and the development of innovative institutional set-ups on a pilot basis. Management, for instance, needs to be designed as a learning process, a team process, emphasizing organizational capacity rather than individual skills per se. Data collection procedures and evaluation plans need to be designed to be useful to managers in improving performance and in informing stakeholders about the results, and managers need to be taught how to analyze data more effectively and develop actionable plans.

Conclusions

China's Northwest faces agro-production constraints, diminishing natural resources, population pressures, and institutional, not to mention other infrastructural problems. China's continued emphasis on production is creating dependence on external inputs, diminishing natural resources, and likely to be leading to unsustainability, and at the same time perpetuating the loss of traditional sustainable agricultural practices.

What's needed? -- a long-term development orientation and action plan that comprehensively envisages (1) rational land-use planning, (2) a shift of agricultural research toward sustainable agrotechnology, (3) the institutional reform of agricultural support systems, and their institution building monitored and evaluated by experts external to the institutions involved (e.g., agricultural research, extension and education); and (4) institutional strategies toward more sustainable soil fertility management and better management of water resources through pricing policies.

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[7]. Adopted by the U.N. Conference on Environment and Development (UNCED) held in Rio de Janeiro, June 1992, Agenda 21 is an 800-page collection of proposals for action that countries can take to move toward sustainable development.

The solution to the developmental problem in some extreme cases, may be to shift away from agriculture where there is no potential because of the quality of the land, as in Ningxia's Longde County. Outmigration in the short-term and industrialization in the long-term to be an alternative answer.

Also, a coordinated mix of government and private enterprise development -- including enterprises relating to agriculture, industry and services -- would greatly contribute to rural advancement. In short, a profile of the NW regional situation needs to be developed with regard to the government's new 9th five-year plan (1995).

If China is to continue to be an economic superpower, as many predict, much more attention needs to be focused on agriculture and the way in which it is developed, recognizing at one and the same time farmers' urges toward profitability and the future's requirement of a clean environment and the land's productive sustainability.

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THE OPINION OF WOMEN ABOUT A RURAL DEVELOPMENT PROGRAM IN NORTHERN POTOSI, BOLIVIA

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INTRODUCTION

In their daily relation with natural resources, indigenous rural women have been the managers and invisible protectors of the environment. In the Andean traditional cultures, natural vital resources such as soil, are associated with the feminine gender. The "Pachamama" is the feminine God of earth and fertility, a benign agricultural divinity perceived as the mother that feeds, protects and sustains human beings (*translation* Ranaboldo, 1993). Nevertheless, women have been marginalized from the mainstream of rural development and those from Northern Potosi, Bolivia are no exception.

This rural area is characterized by its practice of subsistence agriculture. Forty-five percent of the population live in extreme poverty. Fifty-six percent of the children are malnourished, 69% of the fertile women suffer from malnutrition, 10.9% of which is serious. Seventy-five percent of the women and 61% of the men are illiterate. The infant mortality rate is 200/1000. This study covers a population of 21,655 peasants who live in the Provinces of Charcas and Alonzo Ibañez, the poorest rural area of South America (UNICEF- ProAndes, 1994, Provincia de Charcas: Plan Participativo de Desarrollo Municipal, 1995-1999).

PURPOSE

The basic purpose of this study is to examine the opinions of women about the strengths and weaknesses of a people centered, farmer-led extension program so that governmental and non-governmental programs can improve the planning and implementation of future programs. The information was taken from a larger study entitled "The Opinion Of The People: Impact Of World Neighbors Participatory Development Programs On The Quality Of Life In Northern Potosí, Bolivia" (Vecinos Mundiales, 1996).

METHODOLOGY AND DATA SOURCES

The methodology used in this study was Rapid Rural Appraisal (RAP). The research included 42 villages that were selected at random from a universe of 120 communities divided into four programs developed by World Neighbors in this area. Leaders from the sample villages then agreed on one control community, which had never benefited from the programs. The information provided by this community was compared with that of the other sample communities in the same program.

As the study progressed World Neighbors staff realized the importance of analyzing the opinions of women versus men. For this reason the number of women interviewed varies somewhat by program. Since most women are very shy about speaking in public, any woman who spoke up qualified as an informant.

Table 1.

Programs	No. of communities visited	No. of women interviewed
San Pedro de Buena Vista	10	08
Pairumani	10	20
Chiroq'asa	11	10
Sacaca	11	14
Total	42	52

Discovering the vision and opinion of the peasant women was of great interest to World Neighbors because mothers are often left behind to care for their children and crops while fathers migrate to cities to earn additional income. Worse yet, civil wars throughout Latin America have frequently left widows to feed and rear the children. Today for example, there are 14 widows in a population of 58 families in Cuchokisera, Peru.

The data was collected by means of semi-structured interviews and direct observation. Women were interviewed alone, with their husbands, and in groups of men and women which formed spontaneously. The following key questions guided the study:

(1) How did the beneficiaries learn the technologies?

(2) Which technologies were most accepted and used by the beneficiaries?

(3) Did the programs improve the quality of the lives of the beneficiaries and their communities?

RESULTS AND CONCLUSIONS

Chart 1.

Women. ***How did the beneficiaries learn the technologies?***

Category	communities benefited	control
Dissemination activities	**"by listening and by looking at:**	
	*educational fairs	---------
	* field days	---------
	* practical demonstrations	---------
One day courses conducted by promoters at the community level	* **"by listening and "looking"** at the training activities done in the community.	--------- ---------
Technical advice	* volunteer promoter in vegetable production.	---------
	* WN promoter in vegetable production.	---------

Chart 2.

Men. ***How did the beneficiaries learn the technologies?***

Program of San Pedro de Buena Vista

Category	communities benefited	control
Dissemination activities	* field days	---------
	* educational fairs	---------
	* practical demonstrations	---------
	* educational tours	---------
Short 1 to 2 day training courses	* in the community	---------
	* in the training center	---------
Community visits	* WN promoter	---------
	* volunteer promoter	---------

On first sight, the information displayed in charts 1 and 2 looks rather similar. The women knew men had attended short courses and seminars. When the team asked why they had not participated directly in the training activities they said "*...when they have courses, they are not interested in women*", "***they invite only the men***", "*the women only look on because they don't invite us to the work. Through* ***looking and listening*** *however we have learned*".

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In contrast, everyone was invited to attend the annual provincial festivals, so they were ranked first by the women. At these events each family purchased or brought their own food, so the women had more time to visit the agricultural booths that displayed the results of experimental field trials conducted by different farmers that year. Since many families brought part of their harvest to sell, they also acquired the necessary cash to purchase agricultural inputs.

Program staff from San Pedro de Buena Vista discovered that organizing athletic events at these fairs could also enhance the dignity of women. They began with soccer games and then added a 10 km foot race down the river bed below the rural town. Men were amazed when a young farm girl won second place two years in a row! These activities also helped build cooperation amongst leaders from the valleys and highlands which have fought viciously for millenniums.

As leaders from two other important rural towns saw the popularity of these activities grow, they replicated them with their own creative additions. The town of Chiro'qasa decided to call their annual festival "The Potato Festival." All of the local farmers were invited to bring their best potatoes to the event. They were displayed and prizes given to the winners. This helped local farmers identify the best leaders in potato production, learn where they could purchase the best seed, etc. Women also spontaneously composed songs in Quechua describing their enthusiasm for program activities. It had never occurred to program personnel what an important role song could play in motivating farmers to test new ideas.

Chart 1 reveals that women learned by "looking and listening" at field days. However, some women said, **"we were invited to prepare the meal for the event."** World Neighbors has encouraged program staff to organize these events without meals, however this policy is contrary to **strong** cultural tradition. If you have had a bountiful harvest you are supposed to share by preparing a meal for every guest.

Women also commented that when the male promoters came home from the monthly provincial training courses they inquired about what they had learned In the words of one women "...*men have learned*... ***because we are intelligent we have learned from them***".

When asked to evaluate the weaknesses or gaps in the work done, some of the women reported that "*some of the volunteer promoters failed ...he does not go to the courses*", "*...certain technical personnel do not support us*".

Chart 3.

Women. ***Which technologies were most accepted and used by the beneficiaries?***

Category	communities benefited	control
Agricultural technologies	* experimental field trials	---------
	* recommended size of seeds	---------
	* deep tillage	---------
	* distance between potato rows	---------
	* distance between plants	---------
	* pest and disease control	idem
	* fertilization	----------
	* improved seeds	idem
	* vegetable production	idem
	* green manures	---------
Animal husbandry	* construction and use of sheep dips	idem
	* treatment of internal parasites	--------
	* Vaccination	--------
Conservation of the environment	* water and soil conservation	----------
	* forestation	----------
Other technologies	* bread-making	----------
	* literacy	
	* nutrition	
	* manual arts	

Chart 4.

Men. ***Which technologies were most accepted and used by the beneficiaries?***

Program of Chiroq'asa

Category	**communities benefited**	**control**
Agricultural technologies	* distance between rows of potatoes	* idem
	* levels of fertilization	--------
	* green manures	--------
	* pest and disease control	--------
	* recommended size of potato seeds	* idem
	* deep tillage	--------
	* fertilization	(*)-----
	* cultural practices	
	* construction of silos	* idem
	* experimental field trials	
	* distance between plants	
Animal husbandry	* construction and use of sheep dips	* idem
	* disease control	--------
	* vaccination	--------
Conservation of the environment	* water and soil conservation	--------
	* forestation	--------
	* construction of hot houses	-------
Other technologies	* construction of irrigation ponds	-------
	* construction of community centers	-------
	* implementation of a bakery	-------
	* construction of roads	
	* construction of irrigation ditches	

(*) A member of the control community asked Paulino Ossio to give him improved potato seed to plant an experimental field trial.

Women recognized that the technologies most accepted and used were those that related to agricultural production, animal husbandry and protection of the environment Again it was a surprise that the answers given by men and women were so similar As an example, compare the answers of the men of the program of Chiroq'asa with those from women from across the four projects. (See charts 3 and 4). However, forestation and vegetable gardens were the activities that most interested them ***"Men have little interest in forerstation. They don't cook and we are the ones that need wood to cook, men only eat"***. Others said, *"During 2 or 3 years we worked on forestation, we made seedlings, those eucalyptus you see over there are from our nursery. Animals have destroyed them, the people kept them away, others from the same community have robbed the plants..."*.

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The results of this study found that planting vegetables was also important to women The vegetables most frequently found were onions, lettuce, carrots, locoto and tomatoes They said they were happy because " *we can eat vegetables* ".

They observed that the technologies used by the men in the communities facilitate work in the fields and increase the production "*The (experimental) trials are useful, later we can plant larger extensions*" "*When men see how Lupines (planted as green manures) improve production, they use it.*" "*The most important thing World Neighbors has done is planting with fertilizer and with lupines*". Others said "*...That is only for those who understand how to improve, others don't select (the seed) because they don't have interest in learning*".

Adult women, girls and young children are responsible for the care of the animals Sometimes they have to walk long distances to find grass and water. Even though they were not included in the monthly two day extension training seminars, they participated in the massive vaccination and bathing campaigns "*Animals die because nobody cures them...some still cure their animals with quack doctors.*" "*Animals recuperate when we control them (treat them for parasites)*". " *An animal that is not bathed is thin and has ugly and poor wool*".

In one control community women commented "*Julio (WN promoter) gave us wheat seed, he gave them to a neighbor and so they arrived ... and produced quickly! Next year we will have seed, frost does not harm these seeds, our seed is slow, the other seed gives good yields...*"

It was helpful to discover that women disliked the way the training given to them in nutrition, literacy, manual arts, had been passed around from one institution to another They said it caused them to feel abandoned This first occurred when the Claretian Mission asked World Neighbors to delegate all women's work to the nuns Several years latter the Mission transferred their project to Yuyay Japina, a literacy program financed by Unicef-Proandes In their words "*World Neighbors stopped working with women*", "*they (the Mission) abandoned us with the Yuyay*". "*...before World Neighbors supported women with short courses, they helped us learn to knit and gave us literacy classes*".

Chart 5

Women. ***Did the programs improve the quality of the lives of the beneficiaries and their communities?***

Category	communities benefited	control
Personal level	* buy things for the house	--------
	* possibility of selling	--------
	* better nutrition "we can eat vegetables"	--------
	* better production means more food for consumption	--------
	* change of attitude regarding the importance of children's education	* idem
	* adult women want to learn to read and write	* idem
Community level	* progress in the crops	--------
	* increase in production	--------
	* learning new agricultural technologies	--------

Chart 6.

Men. ***Did the programs improve the quality of the lives of the beneficiaries and their communities?***

Program of Chiroq'asa

Category	Communities benefited	Control
Personal level	* family progress	--------
	* change in the way of thinking	--------
	* more knowledge	--------
	* possibility of buying things for their homes	--------
	* tranquillity	--------
	* change in the way of life	--------
	* increase in family income allows children to receive education	
	* possibility of selling the production	---------

Community level	* the use of technologies and green manures makes the field work easier	--------
	* there is no need to transport the family and animals for organic fertilization	--------
	* production increases when planting with technologies	
	* better yields produce more income	--------
	* change in the way of planting	

Women appreciate having more income to buy "things" for their homes and the increase in the amount of food, both for consumption and for sale. In their opinion "*we are improving our lives, thanks to the support*", "*... the people that improve are those who want to do it*", "*...with the improvement of production we can sell part and buy necessary things for our homes*". There is also a change of attitude and a need for education They consider it important both for children and for adults. *Even when girls continue to graze the animals, parents now want a better education for them.* This opinion was shared by all women interviewed. They also appreciate the changes in the community, participation of some of the members in the training events. They are conscious that improved yields in crops are due to the new technologies learned by the men. Nevertheless, they also commented that even though " *there is improvement, people in the communities should be more united when performing the activities*".

In the control communities in Pairumani and Chiroq'asa, women had "heard" or "seen in other communities" agricultural technologies such as pest control, improved potato seed and other improved seeds but they said "*Our production is poor, we don't know the improved seeds...we use the traditional seeds*".

EDUCATIONAL IMPORTANCE

The majority of the 800 million people who go to bed hungry every night live in rural areas If this hunger is to be eradicated, women must be given at least equal priority in participatory development programs

This study has helped World Neighbors Andean Area identify eleven policies that enhance the participation of women in rural development programs

- Allocate funds to insure that equal numbers of men and women, in comparable leadership positions, are employed within the institution and programs. The implementation of this policy has met with strong male resistance because funding this has required a reduction in the number of programs
- Carefully review annual program plans to make sure both genders have participated in the planning process

- Insist on gender breakdown in all program activities and results

  Encourage both male and female staff to invite women to all training activities and field days
- Organize agricultural booths to display the results of farmer experimental field trials at annual provincial fairs
- Make sure women and their organizations have access to materials required for conducting their own field trials. (This has also met with male resistance because the number of men who received materials had to be reduced)
- Give importance to training in forestation and vegetable production which are of particular interest to women.
- Conduct training activities at the community level (instead of provincial level) for preferably a half day.
- Sign cooperative agreements with the Ministry of Education to incorporate rural female teachers in these programs. This enables them to motivate younger girls and women to participate. World Neighbors is pleased that the National Secretariat of Education currently provides ten full time counterpart teachers, two of which are women, for the programs we support in Northern Potosi Bolivia
- Seek to involve couples (for example rural teachers) who share leadership responsibilities without competition. Currently two rural teacher couples serve as counterparts. In one case, the woman was elected the first mayor of San Pedro de Buena Vista. Later her husband was named the Prefect for the Province of Charcas.
- Insure that all programs have information and access to reproductive health services to help families space their children so that women have the strength and time to participate in program activities.

The implementation of these policies requires a change of mentality, attitude, and action that had to begin with WN staff and program partners. In addition, farmer promoters have to become models in the way they treat their wives and provide space for their personal development. This involves cultural transformation, **a long term goal!**

In 1974 John D. Rockefeller III said "Women contribute in numerous ways to the national life of every country. In most developing countries women are crucial to the economic standing of the families, because they are responsible for food crops, they supplement family income through home - based arts and crafts, they are often the head of the household. But unfortunately women are often discriminated against in education and employment or excluded from such opportunities altogether.... For all these reasons, new and urgent attention to the role of women must be a vital characteristic of any modern development program. What happens to women in the course of development efforts needs to receive careful consideration, both from internal planners and external supporters. This will be essential to assure achievement of national economic goals, but that is also compatible with universal standards of human dignity and justice...." (United Nations World Population Conference, Bucharest, Romania, 1974)

"If you educate a man you educate a person, but if you educate a woman you educate a family" Ruby Manikan, Indian church leader (Wigg,D)

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EDUCATIONAL CHANGE IN CHINA:
MAKING THE MARKET SYSTEM WORK

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EDUCATIONAL CHANGE IN CHINA: MAKING THE MARKET SYSTEM WORK

Introduction

Since 1979, China has been changing its economy to a market-based system. During the last ten years, this change in economic policy has lead to a 9.7% average across-the-board increase in gross domestic product (U.S.D.A., 1996). According to the Asian Development Bank, agricultural output increased by 4.5% in 1995 (Asian Business Review, 1996). This remarkable change in income-generation has fueled a large demand for higher quality and quantity of foodstuffs. As the income level of the average worker increases, there has been a corresponding increase in the need for the agricultural sector to produce more food. In addition, each year there are approximately 15 million additional people born in China. At the same time, the cultivated land area continues to decline. Currently, China has more than 23% of the world's population and only 7% of the arable land (Lilan, 1995).

In the past, China has had a policy of self-sufficiency in food production. During good crop years China exported grains in the world market. As recently as 1992-94, China was a net exporter of grains. However, this trend was quickly reversed in 1995 when they again imported grains to meet the needs of a burgeoning number of consumers. Primarily, this grain is being used to feed livestock and, in-turn, meet the large domestic demand for an improved diet that includes more meat products (U.S.D.A., 1996). A combination of these factors has led the government to realize they must improve the agricultural education delivery system in China.

In the last five years, most of the use of agricultural land has been turned back to the people with the expectation that more food would be produced in a freer market system: "Socialist Market Economic Structure." According to the Asian Development Bank, agricultural output increased by 4.5% in 1995 (Asian Business Review, 1996). However, it has also become clear that farmers lack the education necessary to make the dramatic increases needed to keep pace with demands for food products. As a result, farmers are experiencing more demand at higher prices for their food. However, they have limited knowledge of how to produce more food and extension agents lack the ability to deliver the technical knowledge and practical skills needed to help. To illustrate the importance of self-sufficiency in food production, China has increased the agricultural investment of infrastructure by 33%. Despite some of the historical weather-related problems inherent in China, the government is expecting that with this investment it will yield an additional increase of 10 million ton a year (Asian Business Review, 1996).

The government is working to improve the rate of technology transfer. The current rate of 35% is targeted to increase to 60% by the year 2000. To accomplish this goal, the Ministry of Agriculture is improving the training of the national system of agricultural technologists at the township level. In addition, two and a half million farmers will also be educationally upgraded to receive technical titles by the year 2000 (*China Daily*, 1996).

Vocational education is important to the Chinese economy. Polytechnic schools turn out 11 million graduates and they are believed to have great economic impact. "The technical and ethics training students receive in schools enable them to better achieve economic growth and through improved management and advances in science and technology" (*China Daily*, 1996, p4). However, educational planners understand the development of vocational education in China lags far from being satisfactory as compared to education in more developed countries of the world. Chinese government officials see the impact of developed vocational education in more developed countries as an essential investment. At the same time, officials see that vocational schools are "plagued by the problem of funds scarcity, lack of competent teachers, and sound teaching system" (1996, *China Daily*, p4).

Purpose

The purpose of this paper is to explain how the Ministry of Agriculture in the People's Republic of China is changing its system of education to meet the demands of the marketplace. This philosophical paper will explain the background, philosophical tenets, and models the Ministry of Agriculture (MOA) are using to change the way agricultural education is delivered to farmers and students.

Background

There are three hundred and sixty-five vocational schools in China that teach agricultural education. These schools are primarily resident schools that educate students from age 17-22. The average enrollment of students at these schools ranges from about 1000 to 2500 students per school. These schools historically have graduated students in the technical fields of animal science such as veterinary science, agricultural mechanics, agronomy, horticulture and plant protection.

Students were being prepared to be technicians in fields of agriculture. However, the pedagogical approach was focused on delivering content to students primarily through lecture. Laboratories were established and run on a theoretical basis. School farms were being operated for profit and, to a limited extent, teaching.

Philosophical Tenets

Centrally Controlled Government

The centrally controlled economic system in China has been responsible for a dependency syndrome. Adapted from the Soviet model, the demand for trained workers inside the government enterprises was driven by the government and not by true needs in the workplace. As the new market-based economy has begun to emerge, workers are moving more freely within the job market, and this coupled with demand for more food, has fostered a need for reforms within the agricultural educational system.

Unfortunately, the educational system and curricula were also modeled after the failed Soviet system. For example, teachers at vocational schools have indicated they lectured more than 80% of the time. Textbooks and materials were old and outdated. Computers and teaching aids were nonexistent in most schools. Teachers and administrators readily admitted that little practical knowledge and technical skills were gained by the graduates of these schools. Schools and administrators had little influence over curriculum planning and delivery in the past. Students were literally dropped at the school house door, picked up four years later, and placed in jobs. Combined, these factors led to inefficiency and lack of productivity in schools and the marketplace.

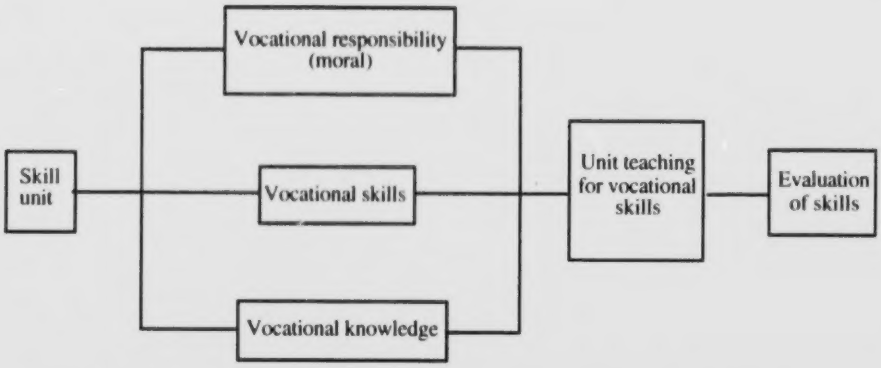
In addition to the Soviet influence, the Chinese have centuries of culture upon which they base much of their philosophy and teaching methodology. Teachers and students alike are constantly aware of customs and protocol that drives how they teach and learn. The use of lecture, for example, is a revered practice that goes back to Confucianism and Taoism (Little & Reed, 1989; Barrett, 1996). These cultural models are deeply rooted in the Chinese educational system and will continue to influence any attempts to make revisions in the way students are taught.

Change Within the System

As the government has moved to meet increased demand for food, it has also developed a project with the Food and Agricultural Organization (FAO) of the United Nations to improve teaching quality (Ingkasuwan, 1994). Under the former system, the state made unilateral decisions about all aspects of education. These decisions included teaching plans, the syllabus, the textbooks, and content. Under the new system, there will be more room for local decision making within the context of meeting the demands at the marketplace for trained technicians. Also, curriculum committees are being reformed to help develop and remodel the suggested curricula. The state is working to help these committees structure their work so that it utilizes Competency-Based Education (CBE) and the Modular Teaching Approach (MTA).

The models suggested by MOA are based on a Chinese adaptation of CBE and MTA. As shown in Figure 1, the first model integrates the use of vocational responsibility, skills, and knowledge within the unit teaching approach.

Figure 1. Teaching Unit and Unit Teaching


Vocational responsibility (moral)
Skill unit
Vocational skills
Vocational knowledge
Unit teaching for vocational skills
Evaluation of skills

Presented by Madam Li, Vocational Agricultural Conference, Yantai, China, August 13, 1996.

In the Chinese context, vocational responsibility means the students should have a positive attitude toward their field of study and future work. As in many places in the world, agricultural occupations are considered to be hard and dirty work in China. Using this model, students should be encouraged to see the benefits of agricultural labor. The administrators of change realize their programs have been too academically oriented in the past. Therefore, government officials have made skill development an important element of the model. Teachers now will be able to see how important it is to effectively incorporate skills into the curricula. Vocational knowledge refers to the relevance of the educational system in society and how it can impact the lives of people. Vocational knowledge also is an indication of how education can be transferred to specific jobs. Clearly, the models shows that skill development is the most important element in the unit teaching approach. Vocational skills are evident throughout the model with evaluation of the skills the final step. This model represents a vast departure from the past academic approach of rote memorization for comprehensive exams.

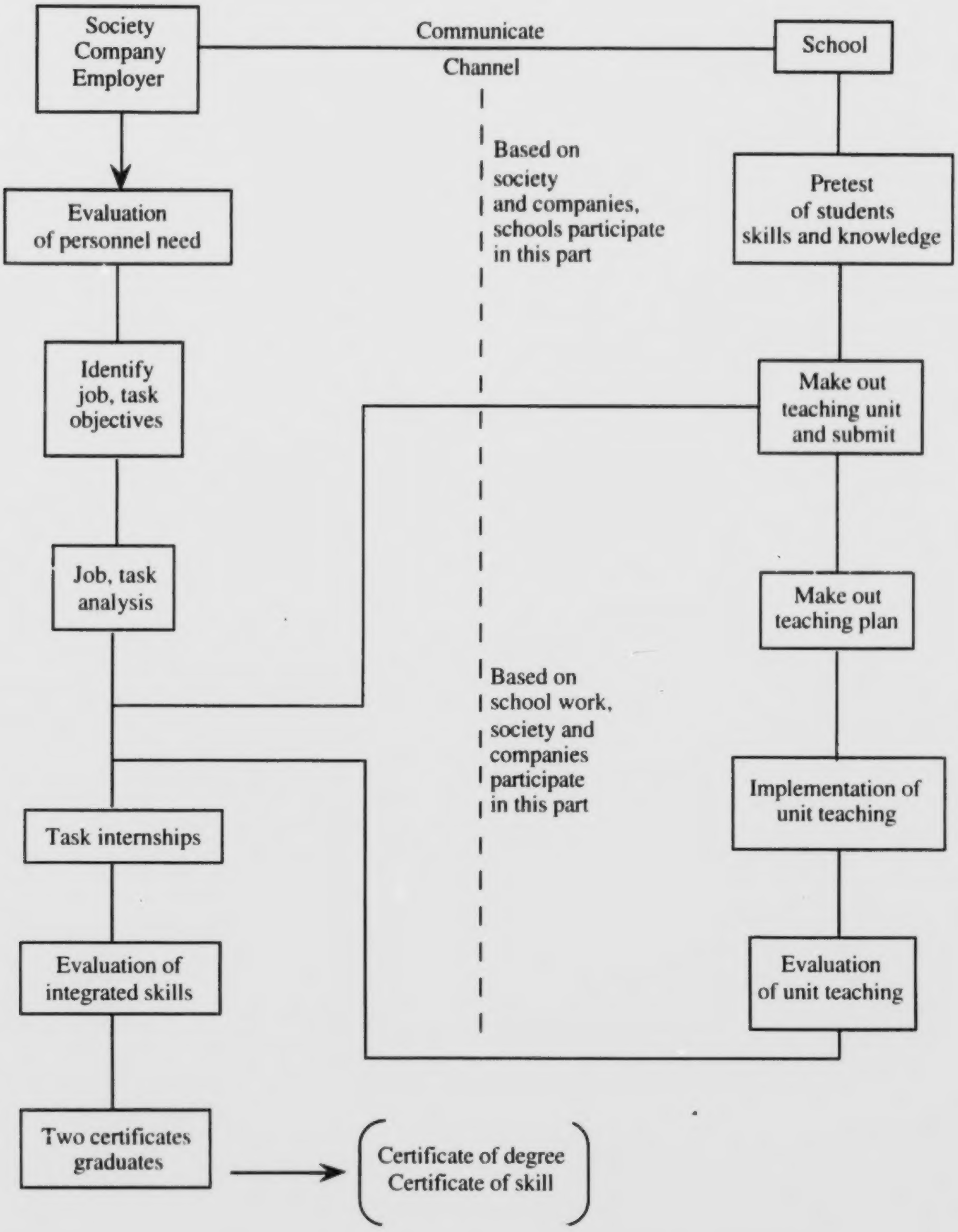
Figure 2 represent the comprehensive model of educational reform for vocational education in China. In this model, educational administrators are suggesting that the total vocational programming effort in China will change. Schools are asked to communicate with employers in society to determine the jobs, tasks, and objectives of work. This is a significant departure from previous delivery system. Once schools have collected job skill information from employers, schools will then develop units of instruction around these tasks. Units and subunits will be developed and teachers will evaluate the progress that students make based on students' ability to complete skills. Internships are a critical component of the new model. Through internships, students will integrate their skills into the working world. Students will be held to high standards throughout the program. Students will be asked to meet the standards of skill development and academic development. Upon graduation, they will be awarded a certificate of degree and a certificate of skill. Most notably, this model incorporates the active participation of society, business, and government into the educational decision-making process.

Implications for Education

Nearly eighty percent of the workforce is still employed in production agriculture. In the future, the percentage of people working in agriculture will drop as the food system becomes more mechanized and efficient. Recent estimates indicate that 170 million people have migrated from rural to urban communities seeking employment (Asian Business Review, 1996). To meet the growing needs for food in the marketplace, the technicians will need to be better trained, as well as trained in areas that are in the greatest demand. In order to meet the needs of society, the government is making radical changes in the way students are trained and taught. Communicating with employers is an important step in the redesign process. Adapting models of education from the outside with modifications that will meet the needs within the Chinese context are also an important educational consideration. Reform efforts of this magnitude will require much time and reintroduction effort to meet the needs of the unique schools found across the countryside. The Ministry of Agriculture will need to make a considerable effort to educate administrators, teachers, and the greater agricultural community of the needs of students in the new Chinese marketplace.

Each year there are 15 million people added to the world's largest population and necessity to increase food production is obvious. Economically, China is projected to have the fourth largest foreign exchange reserves at 81 billion U.S. (1996) and is expected to have the world's largest economy by the year 2015 (Asian Business Review, 1996). To meet the increased need for quantity and quality of food stuffs, the incentives and the know-how to produce food will need to evolve over time. Therefore, the education change these models represent have a significant implications to impact one of the world's largest agricultural educational systems.

Figure 2. Vocational Educational Change Model


Society
Company
Employer
Communicate
Channel
School
Based on
society
and companies,
schools participate
in this part
Evaluation
of personnel need
Pretest
of students
skills and knowledge
Identify
job, task
objectives
Make out
teaching unit
and submit
Job, task
analysis
Make out
teaching plan
Based on
school work,
society and
companies
participate
in this part
Implementation of
unit teaching
Task internships
Evaluation of
integrated skills
Evaluation
of unit teaching
Two certificates
graduates
Certificate of degree
Certificate of skill

Presented by Madam Li, Vocational Agricultural Conference, Yantai, China, August 13, 1996.

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Self-Perceived Professional Competencies Needed and Possessed by Agricultural Extension Agents in the Fars Province of Iran

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Self-Perceived Professional Competencies Needed and Possessed by Agricultural Extension Agents in the Fars Province of Iran

Forty percent of Extension personnel, or about 225,000 agents, in the developing countries have inadequate technical and extension training (Swanson, 1990). Increasing the quality of extension staff knowledge and skills is a high priority for many national Extension systems including Iran (Swanson, 1990). One limitation of a progressive extension organization in developing countries, including Iran, has been the over emphasis on technical competency to the partial neglect of professional competency (Hondale, 1982). Professional competency is the ability to perform effectively all the professional tasks appropriate to the position of extension worker (Patel & Leagans, 1968). One weakness, in past approaches, in training extension personnel has been the inability to focus on the development of professional competencies (Easter, 1985). Attainment of agricultural self-sufficiency requires competent extension personnel planning and carrying out educational programs to meet farmers' needs (Salmanzadeh, 1988).

To be effective, extension personnel must possess the necessary process skills to work within the extension culture (Buford, Bedeian, & Lindner, 1995). Professional competency of an extension worker is based on specialized knowledge, self-direction, and ethics in performing extension functions (Buford, Bedeian, & Lindner, 1995). Extension workers must possess certain professional competencies in order to serve their clientele effectively (Leagans & Loomis, 1977). Understanding what professional competencies are needed and ensuring extension workers possess those professional competencies increases the likelihood extension programming will be effective (Leagans & Loomis, 1997).

Purpose

This paper will explore the self-perceived professional competency levels needed and professional competency levels possessed by agricultural Extension agents in Fars Province of Iran. The following questions served as guides in accomplishing the purpose of the study:

1. What are the selected self-perceived professional competency levels, of extension agents in the Fars Province of Iran, needed and possessed in planning, implementing, evaluating, and teaching & communicating?
2. What are the training needs levels, of extension agents in the Fars Province of Iran, from identified self-perceived professional competency needed and possessed?
3. What are the demographic characteristics of extension agents in the Fars Province of Iran?

Methods and Data Sources

The study used a descriptive survey design. The research assessed the perceptions of 75 agricultural Extension agents regarding their professional competencies needed and professional competencies possessed in Fars Province of Iran. A random sample of 75 agents was selected for participation in this study (Krejcie & Morgan, 1970). The data collection instrument consisted of two sections. The first section was designed and used to collect selected demographic data on extension agents in the Fars Province of Iran. The second section used a Likert-type scale to gather data on the professional competencies possessed and professional competencies needed by extension agents in the Fars Province of Iran. A response of one indicated the competency was not important (possessed) and a five indicated the competency was very important (needed). Discrepancy ratings were determined by subtracting mean ratings for self-perceived competency levels possessed from mean ratings for self-perceived competency levels needed. Content and face validity were established by panel of experts consisting of faculty and graduate students in the Department of Agricultural Extension and Education at Tarbiat Modarres University.

A pilot test was conducted three weeks before the study. The general characteristics of the pilot test group were similar to the population used in this study. Some modifications were made in the procedures and questionnaire because of the pilot study. A cover letter, the questionnaire, and a stamped return envelope were sent to agricultural Extension agents in the Fars Province of Iran. Data was analyzed using Statistical Package for the Social Sciences, Personal Computer Version (SPSS/PC+). Appropriate statistical procedures for descriptive statistics was used. Reliability for the overall instrument was a Cronbach's alpha=.88.

Results

The respondents average age was 36.5 years (see Table 1). Most agents reported having more than 10 years of Extension experience. Thirty-six percent of respondents had a high school diploma, 32% had a bachelor's degree, 13% had less than a high school diploma, and 19% had advanced degrees. All the respondents were male. Eighty-four percent of the respondents were married.

The professional competencies possessed and needed within planning, based on extension agent perceptions, are presented in Table 2. The highest rated competencies possessed were utilize agricultural specialists (2.73), develop simple survey devices (2.61), and plan programs for short-term needs (2.52). The lowest competencies possessed were assess farmers' needs (2.00), develop an integrated program (2.07), and use existing local social groups (2.07). The highest discrepancy scores (D) between mean ratings withing the planning competency levels possessed and needed were plan programs for long-term needs (1.28), assess farmers needs (1.27), develop an integrated program (1.17), and develop a management plan (1.14). The lowest discrepancy scores between the competencies possessed and needed were plan programs for long-term needs (0.68), identify target audience (0.73), and involve local leaders (0.78).

The professional competencies possessed and needed within implementing, based on extension agent perceptions, are presented in Table 3. The highest rated competencies possessed were conduct farmer meetings (2.62), select location for implementing programs (2.59), and use early adopters (2.49). The lowest competencies needed were organizing farmer groups (2.95), and coordinate extension programs (3.09). The competencies with the highest discrepancy scores between mean ratings within the implementing competency levels possessed and needed scores were coordinate extension programs (0.97), involve local decision makers (0.94), and use informal leaders (0.89).

The professional competencies possessed and needed within evaluating, based on extension agent perceptions, are presented in Table 4. The competency that received the lowest mean rating for competency possessed was prepare evaluation reports (1.91). The competency that received the highest mean rating for competency needed was analyze evaluation data (3.50). The competencies with the highest discrepancy between mean ratings were analyze evaluation data (1.16) and prepare evaluation reports (1.15).

The professional competencies possessed and needed within teaching and communicating, based on extension agent perceptions, are presented in Table 5. The highest rated competencies possessed were promote good working relationships (2.89), use office visits (2.85), and make group contacts (2.80). The lowest competencies needed were use exhibits in teaching (2.86), use problem solving approach (3.00), and use personal contacts (3.06). The competencies with the highest discrepancy scores between mean ratings withing the teaching and communicating competency levels possessed and needed scores were select proper teaching methods (1.20), use several teaching methods (1.19), use problem solving approach (1.06), and apply basic principles of communication (1.05).

Conclusions and Recommendations

The discrepancy scores were positive for all competencies. The results from the discrepancy scores can be interpreted that the respondents perceived a gap between the levels of competence needed and possessed. Stated another way, extension agents perceived a skill-gap between compentencies needed and compentencies possessed. Based on the discrepancy scores, the professional competencies with the largest difference between competence needed and possessed by extension agents in the Fars Province, Iran, are: 1)plan programs for long-term needs (planning); 2) assess farmers' needs (planning); 3)select proper teaching methods (teaching and communicating); 4) use several teaching methods (teaching and communicating); 5) develop an integrated program (planning); 6) analyze evaluation data (evaluating); and 7) develop a management plan (planning).

The findings from this study may be used as one source of information for improving the performance of the extension agents in the Fars Province, Iran. Additional studies of professional competency levels needed and competency levels possessed in Iran should be considered so that more information can be obtained for items to be included in the pre-service and in-service training curricula throughout Iran. Additional studies should be considered to determine the perceptions of farmers toward the professional competency levels needed and possessed by agricultural extension agents.

Educational Importance

Increasing the qualifications of extension agents, in Iran, generally means upgrading their education by at least one level (for example from a secondary to an intermediate level diploma, or from the diploma level to the first university degree level). However, an increase in education does not directly translate into improved job performance because educational programs are not job specific. The first step in designing an in-service training program for extension agents is to conduct a "skill gap" analysis. The results of this study will help training coordinators and supervisors to identify professional competencies that extension agents need to be effective. From the list of essential professional competencies provided in this study, a representative sample of extension agents, in Iran, can be inventoried or tested to determine what major skill-gaps exist; competencies possessed and needed. These gaps can then be prioritized to form the basis of a systematic professional competency in-service training program.

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Tables

Table 1 Means and standard deviations of demographic data of extension agents

Demographic data	Mean	S.D.	Minimum	Maximum
Age (years)	36.5	8.5	25	52
Length of tenure (years)	11.8	9.9	1	27
Number of farm households	3184	3697	341	8200

Table 2 Mean ratings, standard deviations, and discrepancy scores between mean ratings within the planning competency levels possessed and needed

Planning Competency	Possessed			Needed			D
	Mean	S.D.		Mean	S.D.		
Identify target audience	2.51	1.08		3.24	0.94		0.73
Involve local leaders	2.25	0.73		3.04	0.75		0.78
Assess farmers' needs	2.00	0.78		3.27	0.72		1.27
Use an advisory committee	2.38	2.08		3.40	1.80		1.02
Determine goals of the regional and local district		2.20	1.03		3.17	1.18	0.97
Identify current resources	2.35	1.12		3.38	1.80		1.03
Plan programs for short-term needs	2.52	1.80		3.20	1.60		0.68
Plan programs for long-term needs	2.45	2.03		3.73	1.80		1.28
Consider individual differences	2.46	1.60		3.31	1.40		0.85
Use farmers' experiences	2.39	1.60		3.39	1.55		1.00
Apply current resources	2.31	1.15		3.37	1.19		1.05
Utilize agricultural specialists	2.73	2.06		3.65	1.68		0.93
Use Existing local social groups	2.07	1.22		3.06	1.05		0.98
Develop simple survey devices	2.61	2.07		3.48	1.83		0.87
Develop an integrated program	2.07	0.86		3.25	0.76		1.17
Develop a management plan		2.30	1.40		3.44	1.36	1.14

Note. The following scale was used: 1=not important & 5=very important. Some discrepancy scores do not equal the difference between mean possessed and needed scores due to rounding.

Table 3 Mean ratings, standard deviations, and discrepancy scores between mean ratings within the implementing competency levels possessed and needed

Implementing Competency	Possessed			Needed			D
	Mean	S.D.		Mean	S.D.		
Use early adopters	2.49	0.84		3.34	0.92		0.84
Use informal leaders	2.30	0.93		3.20	0.67		0.89
Select Location for implementing programs		2.59	0.86		3.38	0.73	0.79
Involve local decision makers	2.21	0.71		3.15	0.71		0.94
Coordinate extension programs	2.21	1.45		3.09	1.39		0.97
Organizing farmer groups	2.16	1.40		2.95	0.99		0.79
Conduct farmer meetings	2.62	0.90		3.23	0.61		0.61

Note. The following scale was used: 1=not important & 5=very important. Some discrepancy scores do not equal the difference between mean possessed and needed scores due to rounding.

Table 4 Mean ratings, standard deviations, and discrepancy scores between mean ratings within the evaluating competency levels possessed and needed

Evaluating Competency	Possessed			Needed			D
	Mean	S.D.		Mean	S.D.		
Evaluate the performance of farmers		2.35	0.65		3.23	0.61	0.87
Analyze evaluation data	2.34	1.00		3.50	1.54		1.16
Prepare evaluation reports	1.91	1.30		3.06	1.05		1.15

Note. The following scale was used: 1=not important & 5=very important. Some discrepancy scores do not equal the difference between mean possessed and needed scores due to rounding.

Table 5 Mean ratings, standard deviations, and discrepancy scores between mean ratings within the teaching and communicating competency levels possessed and needed

Teaching and Communicating Competency	Possessed			Needed			D
	Mean	S.D.		Mean	S.D.		
Use principles of teaching adults	2.13	0.70		3.12	.097		0.98
Use principles of motivation		2.32	1.25		3.18	1.01	0.86
Select proper teaching methods	2.51	1.10		3.72	1.24		1.20
Use several teaching methods	2.50	1.61		3.69	1.14		1.19
Use exhibits in teaching	1.90	1.34		2.86	1.55		0.96
Use method demonstration	2.41	1.15		3.36	1.21		0.95
Use result demonstration	2.55	1.39		3.49	1.38		0.94
Use peer groups	2.29	1.46		3.30	1.46		1.01
Use problem solving approach	1.93	1.12		3.00	1.09		1.06
Apply basic principles of communication	2.14	0.88		3.20	0.76		1.05
Promote good working relationships		2.89	1.13		3.71	1.24	0.82
Use appropriate language	2.73	1.46		3.36	1.25		0.63
Recruit volunteer farmers	2.48	0.94		3.31	1.03		0.82
Make group contacts	2.80	1.52		3.45	1.29		0.65
Use personal contacts		2.35	0.90		3.06	0.80	0.71
Make farm visits	2.74	0.86		3.50	1.13		0.77
Use office visits	2.85	0.85		3.22	1.26		0.37

Note. The following scale was used: 1=not important & 5=very important. Some discrepancy scores do not equal the difference between mean possessed and needed scores due to rounding.

Session D **Adoption of Innovations**

Session Chair - Latif Laghari
Roosevelt Room

TITLE: A Causal Analysis of the Impact of Information on Adoption of Farming Innovations and Yield: A Mauritian Case Study
AUTHOR: Christine de la Paz, University of Connecticut
DISCUSSANT: Satish Verma

TITLE: Extension Education: A Prime Mover in the Development of Agroforestry
AUTHOR: John Gowland Mwangi, Egerton University, Kenya
DISCUSSANT: Satish Verma

TITLE: Involvement of Kenyan Women in Household Decision-Making Regarding Agricultural Activities
AUTHORS: Florence Nyangara, Joan Thomson, Rama Radhakrishna, The Pennsylvania State University
DISCUSSANT: Satish Verma

TITLE: The Role of Communication Variables in the Adoption of Irrigation Technologies in Lebanon
AUTHOR: Teffera Betru, American University of Beirut
DISCUSSANT: Satish Verma

A Causal Analysis of the Impact of Information on Adoption of Farming Innovations and Yield: A Mauritian Case Study

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Introduction[1]

Evaluating the impact of agriculture information on farm productivity is a recurrent evaluation concern. Hornik (1988) addressed the shortcomings of studies that evaluated the association between information and adoption of farm innovations, and between the adoption of farm innovations and farm productivity. He noted that few studies have established a causal relationship between contact with extension agents (used as a proxy for information) and adoption of farm innovations. He criticized the use of summative measures of farming practices that have been adopted in some evaluation studies. He noted that not all farm practices impact yield to the same extent. Some evaluations also fail to control for the effects of support services. Other studies fail to take into account information from an extension service that is mediated through opinion leaders and input suppliers. A farmer is likely to obtain information from many sources. Some information sources may help; some may hinder. Wealth and related socio-economic factors often determine access to and the ability to use information (e.g., Contreras, 1980, Rogers, 1995). These factors need to be controlled when assessing the impact of information on farm productivity.

Mauritius is a rapidly industrializing island nation with a per capita GNP of $3,030 in 1993 (World Bank, 1995). Sugarcane, planted in 90% of its cultivated area is the predominant crop. The crop is produced by miller/planters and by about 35,000 smallhold planters. The latter account for 45% of harvested area and 38% of sugar produced. About 92% of smallhold planters cultivate less than 2 hectares and many of them are part-time planters (World Bank, 1991). The Mauritian government provides a comprehensive set of support services--research, extension, credit, and crop insurance, input supply, farm mechanization, regulated milling and pricing for cane growing, sugar production and export (Landell Mills Associates, 1991). There are also private sources of information and services (e.g. cooperative societies) that provide loans and distribute inputs. Sugar estates provide many opportunities for communities to observe their farm management practices.

Hypotheses

This study assessed the causal relationships among formal and informal sources of information, adoption of farming practices and sugar cane yields of three categories of small-scale planters. The hypotheses were (a) contact with information sources has a direct causal relationship with adoption of farming practices and an indirect causal relationship with farm yield; (b) information sources with formal relationships to research institutions are more likely to positively influence yield than sources without formal relationships; (c) information has an indirect causal relationship with yields which is mediated by access to farm loans and (d) information is more likely to impact yields of wealthier farmers.

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[1] I thank Landell Mills Limited and the Ministry of Agriculture, Government of Mauritius for access to the data. I also thank the Small Planter Efficiency Study team and staff of Mauritius Sugar Authority who were involved in questionnaire design and data management.

Methods and Data Sources

Data Source and Sample. This study utilized a sub-sample of 430 small-scale owner-farm managers who harvested sugar cane in 1990. The sub-sample was part of a national socio-economic and agronomic survey of 1,200 small-scale sugar planters conducted by Landell Mills Associates and the Mauritius Sugar Authority in April-May 1991. A small-scale planter was defined as operating less than 100 arpents (42.2 hectares). The sampling frame was a national list of sugarcane planters operating individually (including sharecroppers and leaseholders) or in groups (cooperatives, etc.) maintained by the Sugar Insurance Fund Bureau (SIFB). Respondents were mostly male (75%), between 51-60 years of age, with primary level education. About 74% reported off-farm employment. The sample was divided into three groups (Top 25%, Middle 50% and Bottom 25%) based on a multi-item wealth variable composed of farm size, reported household income, and the proportion of household income derived from cane (Cronbach alpha .78).

Measures. **Yield**, the dependent variable, is the reported number of tons harvested from the largest cane field in 1989 divided by the reported size of that cane field. Respondents who reported yields that were two standard deviations above or below the mean were eliminated from the sample. **Agro-climatic location** (southern region), a **farm loan** in the previous three years, and five information sources, were the independent variables. Each is a dummy coded measure.

The information variables are the most common sources of agricultural information named by respondents: (a) **word-of-mouth** (friends, relatives or neighbors), (b) **extension service** (agriculture extension officers, field activities, and radio/television programs), (c) **Farmer Service Centers** (FSCs, a quasi government information, credit and input supplier), (d) **observation of sugar estates'** farm management practices, and (e) **cooperative societies**. The variable pertaining to cooperative societies is a two item measure composed of whether the respondent was a member of a cooperative society and whether they reported it as a source of information (Cronbach alpha .62).

Eight ratoon cane management farming practices were treated as both predictors of yield, and as outcomes predicted by information sources, agroclimatic location, and farm loans. Respondents with reported rates that were two standard deviations from the mean rates were eliminated from the sample. Respondents described these farming practices with respect to their largest cane field.

Fertilizer Rate was created by converting the reported amounts of three types of fertilizer applied to a per hectare rate, and then transforming them into proportions of the amounts recommended. Each fertilizer type was weighed according to the government recommended mix: nitrogen (32%), potassium (52%) and phosphorus (16%) (Landell Mills Associates, Annex 6, p.71) (Cronbach alpha .80).

The variable, **Time of Application,** is the reported number of weeks after harvest when respondents last applied fertilizer to their largest cane field. The extension recommendation was to apply fertilizer on ratoon cane within three weeks after harvest.

The variable, **Number of Applications**, is an average of the actual number of fertilizer applications on their largest cane field, and the respondent's preferred number of applications (Cronbach alpha .80). The current recommendation for ratoon cane is for one fertilizer application within three weeks after harvest.

The categorical variable **Cane Variety** assesses the use of M3035/66, the most widely planted recommended variety.

The **Ratoon Replacement Age Index,** is the average of the reported age of the ratoon stand on the respondents largest cane field, and the age when respondents believe the ratoon stand should be replaced (Cronbach alpha .78).

The variable **Herbicide Spraying,** is a two-item measure indicating whether respondents had used pre-emergent and post-emergent herbicides (Cronbach alpha .68).

The variable, **Time of Weeding,** was the reported number of weeks after harvest when respondents began weeding.

The variable, **Recruiting,** is a dummy coded single item measure indicating if respondents filled gaps in their cane stand.

Procedure. Path analysis was used to test whether the study's hypothesized causal relationships are plausible. The causal modeling program that was used, PATH (Hunter and Hamilton, 1990), reproduces correlations based on the specifications of a hypothesized model, compares the predicted correlations against the actual correlations, and tests differences for statistical significance using a Chi-square test. The model with the smallest average error is selected as the model with the best fit. An average error of.07 or lower reflects a very good fit (Hamilton & Steward, 1991). The program also produces standardized regression coefficients for each specified path.

We began our analysis by specifying that each farming practice directly predicted yield, and that each information source directly predicted each farming practice. We also theorized that contact with credit providers (i.e. FSCs and cooperative societies) had direct paths to farm loans and from farm loans to fertilizer rate and cane variety planted. The model with the best fit for each group was arrived at by (a) removing paths in the initial model that had low path coefficients (less than .10) and were not significant, and (b) by adding paths that were found to be significant by the program's missing links routine. Most of the paths highlighted by the missing links routine specified causal relationships among farming practices.

Results and Discussion

Yield, farm practices, and information sources cited by the three planter categories are presented in Table 1. The groups significantly differed with respect to yield, cane area, proportion of income derived from cane, herbicide spraying and contact with FSCs. The latter two increased as the wealth index increased. The models with the best fit for each planter category are shown in Figures 1-3. The average error is .07 for all three models. The observed correlation (corrected for attenuation) and the predicted correlation matrices are shown in Tables 2-4.

The first hypothesis that information has a direct causal relationship with adoption of farming practices and an indirect causal relationship with yield, was partially supported. Causal links between an information source and adoption of recommended fertilizer rates and between fertilizer rates and yield were found in the three models. In two models, causal links were also found between information and the use of herbicide spraying but without (or very weak) causal link to yield. Contrary to our expectations, a direct negative causal link led from an information source (i.e. cooperative societies) to yield in one model. The effect on information on yield was very small. Knowledge gained from contact with an information source is only one of many factors that enable the adoption of a recommended practice. In turn, farm practice is only one of a host of factors that determine yield.

Among the two less wealthy planter categories, contact with an information source enhanced yield through increased fertilizer rates. Respondents in the Bottom 25% (Fig. 1) and Middle 50% (Fig. 2) planter categories who usually consulted the extension service were more likely to apply fertilizer rates at or above recommended levels. The path coefficient, a measure of effect size, between the extension service and yield was .05 (.20 x .25) and .09 (.20 x .46) for the Bottom 25% and Middle 50% models, respectively. The extension service was the only information source that had an effect on yields of planters in the Bottom 25% category.

Two other information sources influenced farm practice and yields of respondents in the Middle 50% category. Unexpectedly, consulting friends and relatives (word-of-mouth) led to increased yield by increasing fertilizer rates. The path coefficient between word-of-mouth and yield was .07 (.16 x .46). It is likely that there is widespread knowledge of recommendations on fertilizer rates. The recommended rates have remained about the same for many years (Landell Mills Associates, 1991). Contact with cooperative societies directly decreased yields of respondents in the Middle 50% planter category (-.14). Word-of-mouth (-.15) and contact with Cooperative Societies (-.15) decreased the incidence of herbicide spraying, a relatively new recommendation, without affecting yield.

Among the Top 25% planter category, contact with three information sources increased yield through the adoption of three recommended farming practices. Contact with cooperative societies led to increased fertilizer rates and yield. The path coefficient between cooperative societies and yield was .03 (.21 x .16). However, cooperative societies also reduced yield to a very small extent by lowering the incidence of herbicide use, delaying fertilization, and depressing fertilizer rates. The coefficient for this alternative route was -.002. The overall effect of cooperative societies on yield was positive.

Observing sugar estates also led to increased yield by advancing the time of fertilization and increasing fertilizer rates. The path coefficient with yield was .01. Contact with FSCs, a new agency, had a relatively large influence on increased use of herbicide spraying (.31). Adoption of herbicide spraying led to a reduction in the time between harvest and fertilization, increased the rate of fertilization and yield. The path coefficient between FSCs and yield, .003 (.31 x -.24 x -.29 x .16) indicated that the impact of FSCs on yield was very small.

The second hypothesis, contacts with the extension service and FSCs, both with links to research, enhance adoption of farm practices and increase yield, whereas sources without formal links to research (i.e., word-of-mouth, cooperative societies) have little if not negative influence, was partly supported. As discussed in previous paragraphs, regardless of their links with research institutions, contact with the extension service, word-of-mouth, cooperative societies, and observing the farming practices of sugar estates, led to the adoption of recommended fertilization practices and increased yield. Contact with FSCs increased the use of herbicide spraying. However, word-of-mouth and contact with cooperative societies, sources without official links to research, reduced the use of herbicide spraying by respondents in the Middle 50% and Top 25% planter categories, and decreased yields of respondents in the former group.

The third hypothesis, acquiring a farm loan mediates the effect of information on yield was supported but only in the Top 25% planter category. Loans may not be important for small and medium-sized farms because only a few planters reported cash shortages compared to about half of the planters in the Top 25% category (Landell Mills Associates, 1991). Taking a farm loan increased the use of herbicide spraying, which in turn, advanced the time of fertilization, increased fertilizer rates and yield among the Top 25% planter category. However, its effect on yield was very small (path coefficient with yield was .002). As shown in Table 1, herbicide spraying was much more common among wealthier planters.

The fourth hypothesis, information is more likely to increase yields of wealthier farmers was partially supported. As can be seen from the models, the number of information sources and farming practices employed increased with the wealth of the planter category. Among the Bottom 25% planter category, only contact with one information source, the extension service, increased yield. Three sources were cited by the two wealthier planter categories. However, more access to information sources did not result in higher yields. The total effect size of information on yield was .05 for the Bottom 25% and .04 for the Top 25% planter categories. The total effect size for the Middle 50% category was only .02 because of the negative effect of contact with cooperative societies.

Considering only official sources, information from the extension service increased yields via increased fertilization rates applied by planters in the Middle 50% (.09) and in the Bottom 25% (.05) categories. Contact with FSCs was influential in the adoption of herbicide spraying, a practice designed primarily to overcome labor constraints. FSCs only increased yields of planters in the Top 25% category and this increase was very small.

Educational Importance

This study demonstrated a technique for testing causal relationships between information and adoption of farming practices, and between adoption of farming practices and farm productivity. The study confirmed that a causal relationship exists between information and adoption of farming practices, and between information and yield. The overall effect of information on yield was small. The study also showed that some evaluation procedures could lead to an overestimation or underestimation of the impact of information on yield. One practice that could lead to overestimation is the use of summative measures of adopted recommended farming practices. Some of the recommended practices in this study did not increase yield or increased yield to the same degree. Another evaluation technique that could lead to an overestimation is the failure to control for the effects of loans and similar support services. The study also demonstrated a need to account for the effects of misinformation on yield. Finally, the study showed that access to information sources especially by wealthier respondents does not always translate into yield increases.

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Table 1

Descriptive Statistics of Yield, Farm Practice and Information Sources: All Respondents and Planter Category

Variable	All Respondents					Planter Category					
						Top 25%		Middle 50%		Bottom 25%	
	Mean/%	S.Dev.	Min	Max	N	Mean/%	S.Dev.	Mean/%	S.Dev.	Mean/%	S.Dev.
Yield (Ave. t/ha)	58.60	26.75	5.17	144.68	434	60.65	24.94	54.54	26.17	65.52	28.59**
Farm Practice											
Fert. Rate (% rec. rate)	1.16	.48	.33	1.77	422	-	-	-	-	-	-
Time of Fert. (Ave. weeks)	5.37	2.99	1	14	434	-	-	-	-	-	-
No. of Applications (Ave.)	1.62	.45	1	3	434	-	-	-	-	-	-
Cane Variety (% of resp.)	20	-	0	1	434	-	-	-	-	-	-
Time of Weeding (Ave. weeks)	5.44	2.80	1	12	434	-	-	-	-	-	-
Replacement Age (Ave. years)	6.61	1.21	4	9.50	434	-	-	-	-	-	-
Recruiting (% of resp.)	58	-	0	1	434	-	-	-	-	-	-
Herb. Spraying (Ave. index)	.56	.78	0	2	421	.91	.85	.52	.77	.24	.54****
Information Sources (% of resp.)											
Word-of-Mouth	65	-	0	1	434	-	-	-	-	-	-
Extension Service	63	-	0	1	434	-	-	-	-	-	-
Cooperative Soc.	1.17	-	0	2	429	-	-	-	-	-	-
FSCs	15	-	0	1	434	22.8	-	15.3	-	6.1	-**
Observe. S. Estates	20	-	0	1	434	-	-	-	-	-	-
Loans (% of resp.)	26	-	0	1	429	38.6	-	25.5	-	13.7	-***
Southern Loc.(% of resp.)	21	-	0	1	434	-	-	-	-	-	-
Cane area (median category)	3	-	1	7	434	5	-	3	-	3	-****
Income from cane (Rp '000)	16	27.8	3	240	434	42.2	43.9	8.3	5.6	3.1	2.2****
Household Income from cane	29.5	15.3	1	100	434	60.7	22.9	22.2	12.9	9.3	6.3****

Sig. levels: * p=.05, ** p=.01, *** p=.001, **** p=.00

Cane area (ha.) categories: 1 = <.063, 2 = .063<.21, 3 = .21<.42, 4 = .42<.84, 5 = .84<.21, 6 = 2.1<4.2, 7 = 4.2 or more.

Table 2

Reproduced and Observed Correlations Among Variables - Top 25% Planter Category

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. No. of Applications	100	4	-10	-4	-6	-4	22	16	2	18	-22	2	1	-6	8	1
2. Cane Variety	4	100	1	17	-14	4	-13	9	-14	18	10	-7	29	0	8	18
3. Time of Weeding	-10	1	100	-1	-17	-11	1	1	-9	11	-8	-5	-12	14	-4	21
4. Ratoon Replacement Age	-4	17	-1	100	-11	0	-5	1	-12	9	-1	-2	-27	16	-2	23
5 Word-of-Mouth	-6	-14	-17	-11	100	3	6	13	-8	-13	-14	-10	2	-1	16	-10
6. Extension Service	-4	4	-11	0	3	100	-31	7	5	4	-3	-13	3	-4	2	-9
7. Cooperative Societies	22	-13	1	-5	6	-31	100	1	21	5	-13	-13	-18	3	19	-7
8. Farmers Service Centers	16	9	1	1	13	7	1	100	4	29	7	-16	35	1	4	-2
9. Loans	2	-14	-9	-12	-8	5	21	4	100	-5	-7	7	16	-1	1	-14
10. Recruiting	18	18	11	9	-13	4	5	29	-5	100	2	9	22	-3	-16	1
11. Southern Location	-22	10	-8	-1	-14	-3	-13	7	-7	2	100	0	23	-10	8	8
12. Observe S. Estates	2	-7	-5	-2	-10	-13	-13	-16	7	9	0	100	-2	-22	2	-16
13. Herbicide Spraying	1	29	-2	-27	-2	10	-18	35	16	10	23	-2	100	-23	14	-6
14. Time of Fert. Appl.	-1	-5	2	7	3	1	7	-4	-5	-4	-5	-22	-23	100	-28	4
15. Fert. Appl. Rate	1	-4	-2	-5	3	-7	18	-4	7	-15	-1	2	1	-26	100	15
16. Yield	-2	16	21	22	-7	-3	0	1	-5	4	-1	-2	-2	-3	13	100

Table 3

Reproduced and Observed Correlations Among Variables - Middle 50% Planter Category

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Time of Fert. Appli.	100	-53	-19	34	-10	2	0	8	-19	-9	-9	-16	-1	-25	-22	-13
2. No. of Fert. Appli.	-53	100	21	-27	7	-8	-7	-5	14	2	17	20	9	26	34	10
3. Cane Variety	-19	21	100	2	20	-16	-3	18	-1	11	8	26	1	14	42	5
4. Time of Weeding	34	-27	2	100	11	-1	12	7	-9	-8	0	-8	6	-15	1	-8
5. Ratoon Replacement Age	-10	7	20	11	100	-4	-12	17	-11	-17	-16	17	6	9	32	10
6. Word-of-Mouth	2	-8	-16	-1	-4	100	13	-9	2	5	7	1	-12	18	-15	-2
7. Extension Service	0	-7	-3	12	-12	13	100	-3	7	17	10	-4	-4	21	3	-3
8. Cooperative Societies	8	-5	18	7	17	-9	-3	100	-11	28	-2	3	-31	-3	-3	-14
9. Farmers Service Ctrs.	-19	14	-1	-9	-11	2	7	-11	100	-5	18	3	-11	17	10	0
10. Loans	-9	2	11	-8	-17	5	17	28	-5	100	-1	-7	-11	-1	1	-10
11. Recruiting	-9	17	8	0	-16	7	10	-2	18	-1	100	20	-14	12	40	-7
12. Southern Location	-16	20	26	-8	17	1	-4	3	3	-7	20	100	-4	31	54	21
13. Observ. Sugar Estates	-1	9	1	6	6	-12	-4	-31	-11	-11	-14	-4	100	3	4	4
14. Fertilizer Rate	-25	14	8	-7	4	18	21	-3	7	4	10	31	-4	100	20	45
15. Herbicide Spraying	-18	22	42	0	32	-15	-3	-3	6	-10	40	54	1	16	100	11
16. Yield	-12	7	1	-4	0	9	10	-14	5	-2	5	14	2	46	8	100

Note: For both tables, decimals omitted, observed correlations above the diagonal are corrected for attenuation.

Table 4

Reproduced and Observed Correlations Among Variables - Bottom 25% Planter Category

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Time of Fert. Appl.	100	-28	-25	28	7	-26	8	16	4	-18	12	-35	-21	1	-25	-23
2. No. of Fert. Appl.	-28	100	26	-27	-16	24	-13	-17	-4	20	-1	11	15	-5	4	7
3. Cane Variety	-25	26	100	-6	28	38	-36	-22	8	20	-11	16	25	-11	11	20
4. Time of Weeding	28	-27	-6	100	5	-7	1	27	-10	-24	5	-5	-8	8	-1	6
5. Ratoon Replacement Age	7	-16	28	5	100	13	5	0	-20	-15	3	-10	12	7	12	14
6. Herbicide Spraying	-26	24	38	-7	13	100	0	-26	-24	5	-13	16	32	-15	21	4
7. Word-of-Mouth	8	-13	-36	1	5	0	100	20	6	-18	15	-17	2	-9	-8	-10
8. Extension Service	16	-17	-22	27	0	-26	20	100	5	4	20	-1	-9	-1	14	2
9. Cooperative Societies	4	-4	8	-10	-20	-24	6	5	100	10	40	8	-23	-23	-4	-14
10. Farmers Serv. Centers	-18	20	20	-24	-15	5	-18	4	10	100	2	7	24	-13	18	7
11. Loans	12	-1	-11	5	3	-13	15	20	40	2	100	-17	-9	3	4	-9
12. Recruiting	-35	11	16	-5	-10	16	-17	-1	8	7	-17	100	23	-5	20	22
13. Southern Location	-21	15	25	-8	12	32	2	-9	-23	24	-9	23	100	-5	34	21
14. Observe Sugar Estates	1	-5	-11	8	7	-15	-9	-1	-23	-13	3	-5	-5	100	3	3
15. Fertilizer Rate	-25	8	9	-3	2	11	3	14	-7	12	-2	15	34	-2	100	29
16. Yield	-23	9	20	-5	4	11	-5	-2	-1	8	-4	11	15	-2	29	100

Note: Decimals omitted, observed correlations above diagonal are corrected for attenuation.

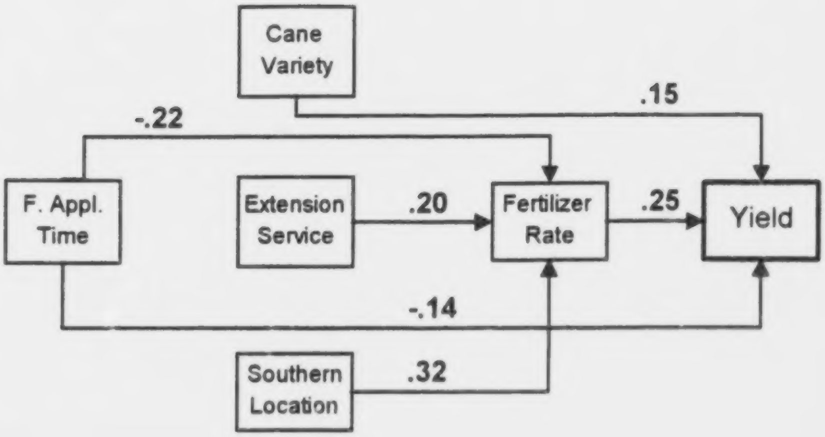
Cane Variety
.15
-.22
F. Appl. Time
Extension Service
.20
Fertilizer Rate
.25
Yield
-.14
Southern Location
.32

Figure 1: FITTED MODEL BOTTOM 25% PLANTER CATEGORY: Causal Relationships Among Information Sources, Selected Farming Practices and Farm Yield

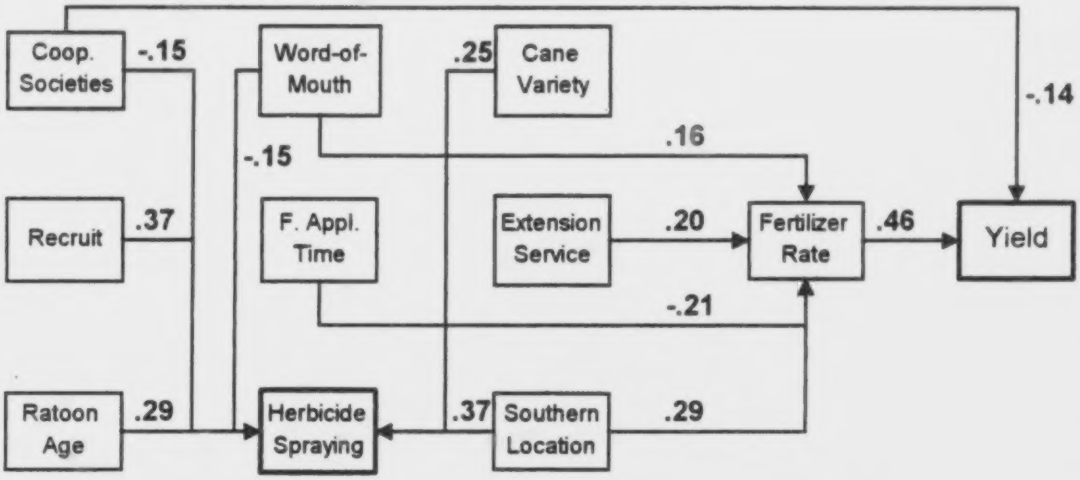
Coop. Societies
-.15
Word-of-Mouth
.25
Cane Variety
-.14
.16
-.15
Recruit
.37
F. Appl. Time
Extension Service
.20
Fertilizer Rate
.46
Yield
-.21
Ratoon Age
.29
Herbicide Spraying
.37
Southern Location
.29

Figure 2: FITTED MODEL MIDDLE 50% PLANTER CATEGORY: Causal Relationships Among Information Sources, Selected Farming Practices and Farm Yield

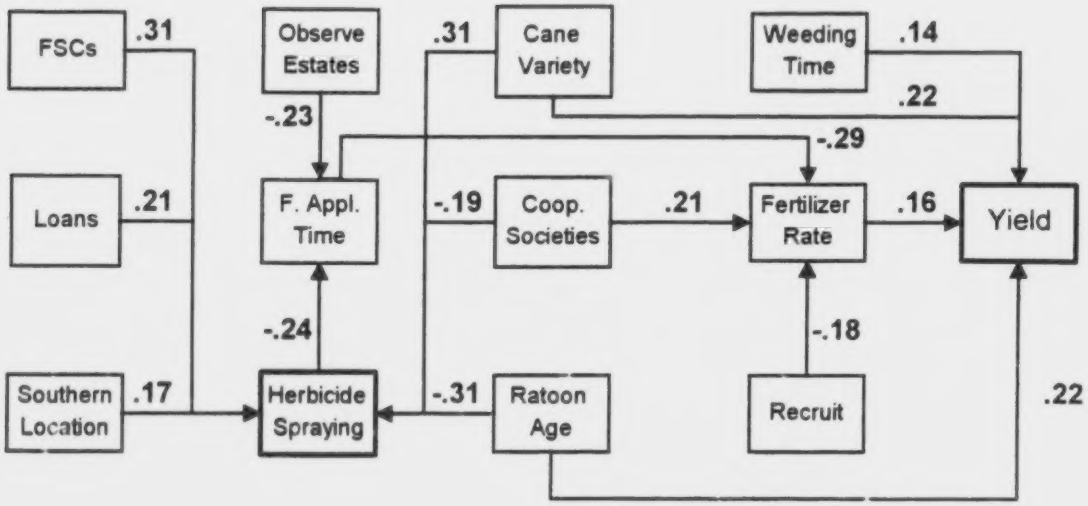
FSCs
.31
Observe Estates
.31
Cane Variety
Weeding Time
.14
.22
-.23
-.29
Loans
.21
F. Appl. Time
-.19
Coop. Societies
.21
Fertilizer Rate
.16
Yield
-.24
-.18
Southern Location
.17
Herbicide Spraying
-.31
Ratoon Age
Recruit
.22

Figure 3: FITTED MODEL TOP 25% PLANTER CATEGORY: Causal Relationships Among Information Sources, Selected Farming Practices and Farm Yield

EXTENSION EDUCATION: A PRIME MOVER IN THE DEVELOPMENT OF AGROFORESTRY

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EXTENSION EDUCATION: A PRIME MOVER IN THE DEVELOPMENT OF AGROFORESTRY

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Abstract: Agroforestry conserves the environment, improves soil fertility and increases land productivity. It is targeted to farm operators from different socioeconomic backgrounds and academic levels. These adult learners have specific learning needs and problems which can only be addressed effectively by someone who understands extension education, communication principles.

In this paper, the author argues that agroforestry promoters need extension education to understand the learning needs, problems, priorities, and opportunities of farm operators as well as the psychological, process, scemantic, physical and economic barriers to adoption. This understanding is important because unclear messages create barriers to learning and make farm operators reluctant to implement technical, agroforestry recommendations. Proper use of extension education principles will ensure that the value of agroforestry messages is not minimized or lost completely through poor or ineffective communication.

Science and the pursuit of knowledge are given high priority by successful countries, not because they are a luxury which the prosperous can afford, but because knowledge and its effective use are vital to national prosperity and international standing (Hassan, 1990). Knowledge in agroforestry - a collective name of land use systems in which woody perennials (trees, shrubs) are grown in association with herbaceous plants (crops, pastures), and or livestock in a spatial arrangement, rotation or both, and in which there are both ecological and economic interactions between the tree and non-tree components of the system (Young, 1987) - is important in engendering and preserving human civilization (Earle, 1993), particularly in Kenya where out of the country's 582,646 Square Kilometers, only 17 % is suitable for rainfed agriculture, and this small portion of land supports over 80% of the population (Kenya's Ministry of Agriculture, 1989; Kenya's Ministry of Information and Broadcasting, Undated). Agroforestry interventions promote a country's development by increasing farm productivity thereby raising farmers' living standards (Chege, 1996). They make many agricultural systems robust especially where rainfall is erratic, the soil infertile, topography difficult and farmers have limited land and capital. Growing more trees on the farm controls soil erosion, increases microbial activity, improves soil physical characteristics, increases the supply of tree products, reduces the pressure on planted and indigenous forests and conserves environmental resources. Trees enrich the soil through heavy litter fall or nitrogen fixation. Due to continually declining soil fertility, as a result of human and animal population pressure in Kenya, hedgerow intercropping was proposed as a low input crop production strategy. Agroforestry - a sustainable land use system - reduces the problems of wood and off-season fodder shortages, rural poverty, low agricultural production, inadequate construction poles, and environmental degradation (Mung'ala, 1996).

Improved agroforestry technologies need to find their way into farmers' fields, and be adopted by farmers if the ultimate objective of agricultural research is to be met. No matter how well new technologies work under researcher management, if farmers do not use them, their development is in vain. *Because change agents may be capable of solving some of the problems confronting the rural people, yet be unable to communicate the necessary solutions if they lacked skills in effective extension communication methods* (MacDonald & Hearle, 1984), they must be conversant with extension education communication principles. Extension education is *an intentional effort*, carefully designed to fulfill certain specifically predetermined and presumably important needs. It emphasizes a two-way communication between farmers and change agents, focuses on farmers' practices and priorities, considers gender and land tenure issues, and enables a change agent to have a deeper understanding of how farmers make decisions related to farming activities and the utilization and marketing of farm products (Mung'ala, 1996: Rudebjer & Temu, 1996).

Purpose

The purpose of this paper was to inform the readers that having the technical know-how in agroforestry alone is not enough for the successful development of agroforestry. The author argues that to be successful, agroforestry promoters must be fully conversant with extension education communication principles. Farmers will adapt their farming systems to improved agroforestry technologies if they can clearly see the benefits and economic importance of applying agroforestry messages.

Methods and Data Sources

The information contained in this paper was derived from a review of the literature and from the author's many years' experience with field extension work among small scale farmers in Kenya. After data collection, the information and arguments most pertinent to the subject were logically organized, prioritized and presented.

Results and Conclusions

Agricultural extension is important for improving farming systems and transferring useful, new knowledge to farmers on a personal basis (Kenya Government, 1985). Extension education can help agroforestry promoters by making them more effective in developing good rapport with farmers and in persuading them to adopt technical messages. Rural people's unsatisfactory, past experience with outsiders has left a legacy of mistrust and a wrong approach in passing technical information may be met with resentment, hostility and suspicion (MacDonald & Hearle, 1984; Roling, 1995). Agroforestry promoters must try to understand their clients' needs, problems and priorities. They must not go to a farmer or community with a ready-made plan for them to follow, without prior consultation, as this will demonstrate a lack of understanding of human nature. They and their clients must try to operate in mutual interest networks by establishing rapport through friendship and by avoiding any sense of superiority by either party. This is important because farmers will not trust advice from a change agent who adopts a superior attitude, regardless of its accuracy (Boyle, 1989). The need for wisdom and diplomatic tact was stressed by a philosopher named Lau Tzu with these words:

> *"Fail to honor people, they fail to honor you; but a good leader,who talks little, when his work is done, his aim fulfilled, they will say "we did it ourselves".*

Agroforestry promoters need to know that communities are not homogeneous but are composed of people of different gender, age, ethnicity, wealth and so on who have different needs, constraints and opportunities. They may enhance their understanding of human nature by trying to be familiar with the psychological, process, semantic as well the physical and economic barriers to adoption (Antholt, 1990; FAO, 1992; Kreitner, 1989; Rogers, 1962). Semantics is the study of meaning in words (Kreitner, 1989). When using technical terminologies to explain agroforestry recommendations, an effort must be made to ensure that farmers understand them as intended. Extension education can facilitate the process of giving this assurance as it encourages the use of simple, familiar words that must specifically express the idea being communicated without being vague. A sincere effort to become a better listener and to eliminate sexist language will improve communication effectiveness leading to increased adoption.

For a practice to be easily adopted, it must possess the following characteristics:
Relative economic advantage, defined as the degree to which an innovation is perceived as being better than the idea it supersedes in terms of economic profitability, social prestige, physical convenience, low initial cost, lower perceived risk, decreasing discomfort, psychological satisfaction or saving time. Changes that cost little will be adopted faster than those requiring large expenditures (Roling, 1990).
Compatibility: defined as the degree to which an innovation is perceived as being consistent with the farmer's sociocultural values and beliefs, past experiences, needs and existing practices on the farm. Innovations compatible with existing farm practices encourage a positive attitude toward change, improve the change agent's credibility, and may be adopted faster than less compatible ones.
Trialability: defined as the degree to which an innovation may be experimented on a limited scale to determine its demonstrated efficacy before adopting it on a large scale. New innovations that can be tried on a limited scale will be adopted faster due to their lower risk to the adopter (Shield, 1993).
Complexity: defined as the degree to which an innovation is perceived as relatively difficult to understand and use. The more complex an innovation is to understand and use, the lower will be its rate of adoption.

Visibility (Observability): defined as the degree to which the results of an innovation are visible to others. Farmers must see the need for a new practice. The more viable the practice and the easier its results are to observe, describe, and communicate to others, the more rapid will be its rate of adoption. Material innovations and concrete ideas that are easily observable are adopted faster than less concrete ones.

Sub-saharan Africa faces a major problem of environmental degradation manifested in the rapid deforestation, thinning of tree cover in wooded fallow, grassification, soil erosion, nutrient depletion and declining soil fertility. Soil erosion, a serious socioeconomic and environmental problem in this region, leads to decreased land resale value, loss of soil fertility, increased farm production costs, sedimentation of streams and lakes and contamination of water supplies with pesticides and fertilizers adversely affecting wildlife habitats and the productivity of erodible agricultural land (Christensen, 983; Easter et al., 1987). Promoting agroforestry in areas with serious loss of soil fertility, through intensified extension education could facilitate the process of protecting the environment, which at present is said to be crumbling faster than the technicians can reassemble (Earle, 1993). Trees like Leucaena, Caliandra and Sesbania increase soil fertility through their nitrogen-fixing characteristics and also provide fodder for the farm animals, while Grevillea is a good source of mulch, wood fuel and timber.

Educational Importance

An understanding of effective extension education communication principles may help in determining farmers' needs, constraints priorities and opportunities; educating them on the values of agroforestry; recommending suitable trees for different agro-ecological zones; encouraging adoption of appropriate technical packages and in evaluating farmers' reactions and attitudes towards past and present development projects. Additionally, it may help in community mobilization for increased participation during projects' identification, planning, implementation and evaluation, particularly when seeking support of respected local leaders and other legitimizers of community projects. Because not every extension communication method is good for every situation, agroforestry promoters should choose the best method for a specific situation. For example, although group and mass methods are used to reach large numbers of people and to stimulate joint action in planning and carrying out projects of common interest, learning is an individual process and therefore, personal contacts should be encouraged because human problems are personal and are best dealt with individually. Farmers will only *act* on the advice and suggestions of a person that they *know, like* and *whose knowledge they respect.* This must be an individdual of considerable personal integrity who will not answer farmers' questions without being certain that the answer is correct. Effective extension workers listen thoughtfully to farmers' opinions before suggesting changes. They develop programs that weave technological improvements into existing farmer's culture rather than changing everything in the farmer's way of life. Two-way communication - between change agents and farmers - is vital for successful extension work in all agroforestry projects.

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Involvement of Kenyan Women in Household Decision-Making Regarding Agricultural Activities

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INVOLVEMENT OF KENYAN WOMEN IN HOUSEHOLD DECISION-MAKING REGARDING AGRICULTURAL ACTIVITIES

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Introduction

The decision-making process in agricultural activities needs to be understood for extension strategies to succeed. Understanding the household as the unit of decision-making and productive activities is especially important where farming is dominated by women. Rural women farmers are responsible for 70% of the agricultural output in Africa (Gittinger, 1990). In Kenya, women provide up to 90% of the labor for agriculture, food processing, and marketing. Development efforts have frequently ignored women's contribution to agriculture, until recently when international and national agencies and organizations have given support for women in development. According to Staudt (1985), Extension Service policies often overlook women and cut them off from the decision-making process in agricultural activities. In addition, women face socio-cultural constraints that restrict their access to resources needed to respond to economic opportunities. Indeed, the agricultural development strategies have not adequately focused on the clientele (Saito, Makonnen & Spurling, 1994). As a result, women's productive efficiency and economic status often rank far below that of Kenyan men.

By the year 2025, Kenya will have an estimated population of 50 million which means that current food production must increase by 35% every ten years to meet food demand (Norton, 1996). The estimated rate of food increase can be achieved only if the production potential of the rural women is fully realized. In recent years, renewed efforts have been made by researchers and policy makers to design policies that address issues related to the involvement of women in agricultural activities. This recognition has prompted an immediate need to search for methods to improve women's level of involvement in the household decision-making process and overcome the socio-cultural constraints that limit the free flow of information and services to women farmers.

Muzaale and Leonard (1985) suggested that women's groups offer a good opportunity for more effective agricultural extension work. In a group setting, women farmers can learn and practice new technical skills and acquire new knowledge, before embarking on their individual activities. Group decisions to implement new practices in Kenya carry more weight than individual decisions. Reluctant extension clients can be more easily encouraged to adopt new ideas in a group setting (Saito and Spurling, 1992). According to Cleaver and Donovan (1995), targeted assistance to the poor people through traditional lineage transfer systems, community sharing, and group activity is the best intervention method. Moreover, both women's groups and agricultural extension programs are designed to address similar objectives; that is, improving the social and economic status of their members (Morgan and Spalding, 1994).

In Africa, working in groups is a common feature compatible with the extended family system on which the foundation of African culture and tradition of communalism and populism are built (Gyllstrom, 1991). Historically, most of the African women were always happy to work in communal groups for the common good of society. Studies in the social and economic systems of rural areas have been extensively carried out by Boserup (1980). Following Boserup studies in the 1980s, other scholars like Nelson (1981), Lewis (1982), Muzaale and Leonard (1985), Staudt (1985), Saito and Spurling (1992), Morgan and Spalding (1994), and (Saito et al (1994) have documented the activities of rural women particularly regarding agricultural extension and women's groups. Findings from these studies indicate that, in general, most women's groups have come into existence for the following three reasons: a) social-cultural groups are formed by related members from the same community to share their labor and in the process socialize and share in cultural activities; b) social-economic groups are formed for socio-economic reasons with specific objectives and goals, they start as labor groups; however, they hire out their labor and save their earnings to help each other during difficult times such as funerals, famine and other domestic demands; c) economic; members are motivated to form a women's group purely for economic reasons. They contribute money, time and labor to start business-oriented activities. Most of the economic groups are registered with the Kenya's Department of Culture and Social Services and are considered formal groups.

Purpose and Objectives

The overall purpose of this study was to examine the effect of women's group membership on the level of involvement of Kenyan women in household decision-making regarding agricultural activities. Specific objectives of the study were to:

1) identify whether or not women farmers belong to a formal women's group;

2) identify decisions which are made on various types of agricultural activities-- planting and marketing of subsistence and cash crops ;

3) determine relationships, if any, between women's group membership and decision-making in agricultural activities-- planting and marketing of subsistence and cash crops.

Methods and Data Sources

The population of the study consisted of 266 rural Kenyan women farmers who had children aged between 6 months to 3 years (weaning age) in two rural regions of Kenya, Muranga and Bomet districts. The children were target subjects in a nutrition study for the nutri-business project funded by the United States Agency for International Development (USAID), involving three universities Tuskegee, Penn State and University of Nairobi. The two regions (Muranga and Bomet) were selected because they have similar economic potential and represent the socio-cultural diversity that exists in Kenya (Muroki et al, In press). Rapid Multidisciplinary Appraisal (RMA) was initially conducted to learn about the communities by an interdisciplinary research team from the three participating universities. An instrument was then developed and field tested by this research team of experts representing extension, horticulture, nutrition, agronomy, veterinary service, health, and anthropology. A baseline survey was subsequently developed to collect the data for the study. Relevant data from this survey about the women and their household decision-making practices pertaining to agriculture, were used to address the questions in this study.

The data were statistically analyzed using the SPSS computer program. Frequencies and percentages were used to summarize the results. To determine relationships between women's group membership and decision-making in agricultural activities, contingency tables and cross-tabulation were used.

Results and/or Conclusions

Objective 1--Group Membership

The results of the study show that about one out of every four women (22.6%) belonged to a formal women's group; that is, a group registered with the Kenyan Department of Culture and Social Services (Table 1). In addition, results also indicate that women from Bomet are slightly more likely than Muranga women to be members of a registered women's group. However, the difference between Muranga and Bomet districts in regard to women's group membership was not statistically significant. Thus, there was no statistical evidence from the data to conclude that a meaningful relationship between district location and women's group membership existed.

Table 1: Women's Group Membership Status of the Rural Women Farmers (mothers of weaning age children) for **Muranga and Bomet Districts**

Women's Group Membership Status	Muranga District		Bomet District		Total	
	N	%	N	%	N	%
Group Member	22	17.7	38	26.8	60	22.6
Non-group member	102	82.3	104	73.2	206	77.4
Total	124	100.0	142	100.0	266	100.0

Chi-square=3.082, not significant at 0.05 alpha level

Objectives 2 & 3---Decision-Making in Planting Subsistence and Cash Crops

Men made most of the decisions in planting and women implemented them, especially when the women were non-group members (Table 2). Mostly, the women who belonged to a formal group were generally more likely to make decisions regarding planting of subsistence crops than those who did not belong to a formal women's group. This trend can be seen with the planting of maize, beans, potatoes, tomatoes, millet, and sorghum. However, significant relationships only existed between membership in women's groups and involvement of women in planting decisions for potatoes (phi=0.15,

$p<.05$) among the subsistence crops (Table 2). In planting potatoes, 96% and 87% of women who were group members in Muranga and Bomet districts respectively, made decisions regarding planting potatoes as compared to 76% and 77% of women non-group members in the two districts. Millet is popularly grown in Bomet, and women who belong to women's group were more likely to make the planting decisions (100%) than non-group members (89%).

Table 2: Women's Group Membership Status and Involvement in **Subsistence Crop Planting Decisions**

Subsistence Crop by Membership Status in Women's Group	Muranga District Level of Decision Involvement				Bomet District Level of Decision Involvement				Relationship
	WOMAN		**OTHER**[a]		**WOMAN**		**OTHER**[a]		Phi
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Maize									
Group member	21	95.5	1	4.5	15	39.5	23	60.5	0.051
Non-group member	71	74.0	25	26.0	36	35.3	66	64.7	
Kale (Sukuma)									
Group member	17	94.4	1	5.6	23	85.2	4	14.8	0.044
Non-group member	45	80.4	11	19.6	72	88.9	9	11.1	
Beans									
Group member	20	95.2	1	4.8	25	80.6	6	19.4	0.116
Non-group member	72	75.0	24	25.0	58	75.3	19	24.7	
Potatoes									
Group member	21	95.5	1	4.5	20	87.0	3	13.0	0.149*
Non-group member	71	76.3	22	23.7	51	77.3	15	22.7	
Onions									
Group member	7	87.2	1	12.5	13	76.5	4	23.5	0.004
Non-group member	21	75.0	7	25.0	30	83.3	6	16.7	
Tomatoes									
Group member	3	100.0	0	0.0	19	82.6	4	17.4	0.182
Non-group member	11	57.9	8	42.1	31	70.5	13	9.5	
Millet									
Group member	0	0.0	1	100.0	26	100.0	0	0.0	0.108
Non-group member	0	0.0	0	0.0	67	89.3	8	10.7	
Sorghum									
Group member	5	83.3	1	16.7	20	100.0	0	0.0	0.043
Non-group member	8	80.0	2	20.0	46	97.9	1	2.1	

[a]. Information reported for the other is to be interpreted in the following manner. The other who appears in the row of group member means the spouse/relative of a woman who is a member of women's group. The other who appears in the row for non-group member means he/she is the spouse/relative of a woman who is not a member of a women's group.

* Significant at 0.05 level

Table 3 presents data related to women's group membership and cash crop planting decisions. A significant relationship existed (phi=0.29, p<.01) between membership status in women's groups and whether the women are involved in planting decisions for avocados. For planting avocados, the percentages were 62.5% and 50.0% for group members in Muranga and Bomet respectively as compared to 23.8% and 33.3% for non-group members (Table 3). For the other cash crops, the relationships were not statistically significant, but examination of the data for each crop reflect a trend similar to that of avocados. However, pawpaw and coffee are not commonly grown in Bomet district. Although coffee is considered mostly a man's crop and popularly grown in Muranga district, it was interesting to note that women who belonged to a women's group (50%) are more likely to be involved in the planting decisions for coffee than the non-group members (14.6%).

Table 3: Women's Group Membership Status and Involvement in **Cash Crop Planting Decisions**

Cash Crop by Membership Status in Women's Group	Muranga District Level of Decision Involvement				Bomet District Level of Decision Involvement				Relationship
	WOMAN		OTHER[a]		WOMAN		OTHER[a]		Phi
	N	%	N	%	N	%	N	%	
Avocados									
Group member	10	62.5	6	37.5	3	50.0	3	50.0	0.287**
Non-group member	15	23.8	48	76.2	4	33.3	8	66.7	
Pawpaw									
Group member	7	53.8	6	46.2	0	0.0	0	0.0	0.193
Non-group member	14	30.4	32	69.6	2	33.3	4	66.7	
Passion									
Group member	7	53.8	6	46.2	8	80.0	2	20.0	0.064
Non-group member	11	37.9	18	62.1	29	72.5	11	27.5	
Coffee									
Group member	2	50.0	2	50.0	0	0.0	0	0.0	0.248
Non-group member	6	14.6	35	85.4	1	16.7	5	83.3	
Bananas									
Group member	15	83.3	3	16.7	18	78.3	5	21.7	0.141
Non-group member	45	52.3	41	47.7	35	68.6	16	31.4	

[a] Information reported for the other is to be interpreted in the following manner. The other who appears in the row of group member means he/she is the spouse/relative of a woman who is a member of women's group. The other who appears in the row for non-group member means he/she is the spouse/relative of a woman who is not a member of a women's group.

** Significant at 0.01 level

Objectives 2 & 3 ----Decision-Making in Marketing of Subsistence and Cash Crops

Table 4 shows the group membership status and decisions regarding marketing of the subsistence crops. Significant relationships existed (phi=0.47, p<.01) between membership status in women's group and whether the women are involved in marketing decisions for potatoes. Higher percentages (100%, 86%) of women that belonged to groups in Muranga and Bomet districts made decisions related to marketing of potatoes than non-group members (50%, 44%) respectively. Even though there were no similar trends for beans, tomatoes and millet in Muranga and onions in Bomet, examining the other crops in each or both districts show similar trends as that of potatoes. Decisions on subsistence farming in rural Kenya, mostly women are involved , however we can observe that women who were group members were even more likely to be involved in the planting decisions than were non-group members.

Table 4: Women's Group Membership Status and Involvement in **Subsistence Crop Marketing Decisions**

Subsistence Crop by Membership Status in Women's Group	Muranga District Level of Decision Involvement				Bomet District Level of Decision Involvement				Relationship
	WOMAN		**OTHER**[a]		**WOMAN**		**OTHER**[a]		Phi
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Maize									
Group member	6	100.0	0	0.0	6	37.5	10	62.5	0.160
Non-group member	11	91.7	1	8.3	13	24.1	41	75.9	
Kale (Sukuma)									
Group member	3	75.0	1	25.0	12	85.7	2	14.3	0.073
Non-group member	12	70.6	5	29.4	24	80.0	6	20.0	
Beans									
Group member	3	75.0	1	25.0	5	71.4	2	28.6	0.062
Non-group member	5	100.0	0	0.0	9	56.3	7	43.8	
Potatoes									
Group member	5	100.0	0	0.0	6	85.7	1	14.3	0.467**
Non-group member	2	50.0	2	50.0	7	43.8	9	56.3	
Onions									
Group member	1	100.0	0	0.0	2	33.3	4	66.7	0.067
Non-group member	0	0.0	0	0.0	3	33.3	6	66.7	
Tomatoes									
Group member	0	0.0	0	0.0	9	81.8	2	18.2	0.217
Non-group member	3	60.0	2	40.0	8	61.5	5	38.5	
Millet									
Group member	0	0.0	0	0.0	4	100.0	0	0.0	0.175
Non-group member	0	0.0	0	0.0	9	90.0	1	10.0	

[a] Information reported for the other is to be interpreted in the following manner. The other who appears in the row of group member means he/she is the spouse/relative of a woman who is a member of women's group. The other who appears in the row for non-group member means he/she is the spouse/relative of a woman who is not a member of a women's group.

** Significant at 0.01 level

Significant relationships existed between membership status in women's group and the women's involvement in the marketing decisions for avocados (phi=0.38, p<.01), coffee (phi=0.37, p<.05) and bananas (phi=0.34, p<.01). See Table 5. In marketing avocados, a higher percentage (78%) of women group members in Muranga district made decisions as compared to (34%) of the non-group members in the same district. Regarding the marketing of coffee, 75% of women's group members in Muranga districts made decisions as compared to 16% of the non-group members in the same district. Regarding marketing of bananas, higher percentages (100% each) women group members in both Muranga and Bomet respectively, made marketing decisions. Only 68% and 64% of the non-group members in Muranga and Bomet were able to make decisions regarding marketing of bananas. A similar trend is observed for pawpaw, although there was no statistically significant relationship. Another observation which can be made is that rural women were more actively involved in marketing decisions for most cash crops (see Table 5) than they were involved in the planting decisions of the same cash crops (see Table 3).

Table 5: Women's Group Membership Status and Involvement in **Cash Crop Marketing Decisions**

Cash Crop by Membership status in Women's Group	Muranga District Level of Decision Involvement				Bomet District Level of Decision Involvement				Relationship
	WOMAN N	WOMAN %	OTHER[a] N	OTHER[a] %	WOMAN N	WOMAN %	OTHER[a] N	OTHER[a] %	Phi
Avocados									
Group member	7	77.8	2	22.2	2	100.0	0	0.0	0.382**
Non-group member	13	4.2	25	65.8	1	100.0	0	0.0	
Pawpaw									
Group member	1	100.0	0	0.0	0	0.0	0	0.0	0.316
Non-group member	4	80.0	1	20.0	3	100.0	0	0.0	
Passion									
Group member	0	0.0	4	100.0	1	100.0	0	0.0	0.207
Non-group member	3	75.0	1	25.0	7	77.8	2	22.2	
Coffee									
Group member	3	75.0	1	25.0	0	0.0	0	0.0	0.365*
Non-group member	6	16.2	31	83.8	2	66.7	1	33.3	
Bananas									
Group member	8	100.0	0	0.0	11	100.0	0	0.0	0.339**
Non-group member	26	68.4	12	31.6	9	64.3	5	35.7	

[a] Information reported for the other is to be interpreted in the following manner. The other who appears in the row of group member means he/she is the spouse/relative of a woman who is a member of women's group. The other, who appears in the row for non-group member means he/she is the spouse/relative of a woman who is not a member of a women's group.

* Significant at 0.05 level

** Significant at 0.01 level

Educational Importance

Economies of most developing countries are agricultural based. Agricultural productivity and food security in these countries are major concerns for the development of these areas. The future stability of these countries and the rest of the world will depend on the availability of adequate food and the improvement of the standard of living for the rural poor. In Kenya, and in other parts of the developing world, women do most of the farm work and constitute a majority of the rural poor. Improving women's involvement in household decision-making in agricultural activities would increase their social and economic status and ensure higher agricultural productivity.

Women's groups offer a good opportunity for getting members into the decision-making process. Educators, researchers and policy makers should: i) design educational programs to demonstrate the usefulness of women's group membership in decision-making; ii) encourage more women to formally participate in group activities; iii) establish linkages with rural women's groups for collaborative agricultural development efforts; and iv) provide needed financial assistance for women's group.

Educational materials relative to planting and marketing of subsistence and cash crops and should be developed and distributed to the women's group.

In addition, findings of this study should be shared with policy makers, administrators, and political leaders, to make informed decisions about involvement of women in agricultural activities.

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THE ROLE OF COMMUNICATION VARIABLES IN THE ADOPTION OF IRRIGATION TECHNOLOGIES IN LEBANON

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ABSTRACT

Future determinants of agricultural and social development in Lebanon are among other factors availability of new irrigation technologies and the manners in which farmers respond to these technologies to save water from agricultural use to other sectors of the economy. The interrelationships between socio-economic variables and the spreading use of irrigation technologies are presented. Specific variables that are likely to enhance the adoption of modern irrigation technologies are identified. Two scenarios are presented to determine the role of communication variables in the adoption of irrigation technologies -with and without adoption decision index (time factor). When adoption decision index was considered, the significant communication variable identified to influence the adoption of irrigation technologies was the frequency of visit of farmers by development/sales agents (R^2=.7870). When the adoption decision index was illuminated from the prediction model, the communication variable that significantly influenced the spreading use of modern irrigation technologies was frequency of reading newspapers (R^2=2230).

INTRODUCTION

Water supplies in most Middle East and North African countries are limited whereas demand is rising rapidly. Unless the anticipated imbalance is controlled in a planned way, the result may be arbitrary and chaotic reduction in demand as users compete for the limited supplies available (The World Bank, 1994). In Lebanon, the renewable resources per capita in cubic meters declined from 2,000 in 1960 to 1,407 in 1990, and this figure is expected to further decline to 809 by the year 2025 (World Resource Institute, 1993). The World Resource Institute further noted that 85% of withdrawals of available supply of water in Lebanon are accounted by the agricultural sector whereas 11% and 4% are utilized by the domestic and industrial sectors respectively. In 1987, the irrigated land constituted 28.6% of the total cultivated area (The World Bank, 1994).

The dynamic changes occurring from extensive to intensive methods of production make the agricultural sector of major interest to policy makers in Lebanon. Possible determinants of future agricultural and social development will be the availability of new technologies in agriculture and the manners in which farmers respond to these technologies. Differences in the pattern of adoption are likely to occur due to the underlying physical, economic and socio-cultural factors, and farmers perception of the new technologies. Ruttan (1996) noted that the diffusion of knowledge and technology is a central issue in social change. It is thus clear that the adoption of new farm practices has a wide implication for policies of economic and social development.

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The adoption process in this study refers to the mental and physical processes where by an individual farmer goes from a position of not using a new practice to a position of using it to a greater or lesser extent. Intensive sources of original material in the adoption and diffusion of new practices among others are Lionberger (1960) and Rogers (1962). On the economic side, it was widely reported that the adoption of new farm practices is positively related with economic incentives (Fliegel, 1993). That is, innovations with perceived profitability are likely to have higher chances to be adopted. In terms of socio-cultural system, Haves (1975) expressed that the most common variable thought to affect adoption is the interactive effect.

Therefore, the purpose of this study was to identify the specific communication variables that enhance the adoption of these irrigation technologies. It was also intended to explore the interrelationships between socio-economic variables and the spreading use of irrigation technologies in the production of potatoes, which is one of the major irrigated crops in Lebanon.

METHODOLOGY

The classical diffusion model was used in the design of the research. This model views the diffusion of improved practices as a linear approach, rational and planned change processes (Rogers, 1983). The rationale for selection and analysis of variables that account for differences in adoption behaviour as adapted from Fliegel (1993) is presented as:

New Farm Information ----> Antecedents (Farmers' Socio-Economic Characteristics) ----> Communications and Social Participation ----> Outcome (Adoption Decision by Farmers)

This conceptual model gives way to a multivariate analytic technique to the study of adoption and diffusion of improved farm practices.

Adoption scores were constructed as the dependent variable on the basis of level of irrigation system applied by farmers ranging from furrow irrigation as the simplest form to drip irrigation as the most complex system. More points were obtained by farmers as they advance from furrow to drip irrigation. This is based on the theoretical concept that the more complex the innovation is, the less likely that it is to be adopted (Rogers 1983). The adoption point obtained through the use a particular level of irrigation technology was then multiplied by adoption decision index to construct adoption scores. The adoption decision index is simply a reciprocal of the time difference between the year the farmer first used his most advanced form of irrigation technology and the year he first heard about it. This implies that the more time the farmer required to adopt the highest form of irrigation system he is applying, the less would be the adoption decision index, and thus, the less would be the adoption score. This is based on the theoretical concept that farmers undergo though different stages in the adoption decision process (Mason 1962, Beal and Regers 1960). Rogers (1983) identifies these stages in the innovation decision process as knowledge, persuasion, decision, implementation and confirmation. Because of the underlying individual differences, the adoption decision time is expected to vary among farmers.

A stratified sampling procedure was followed to collect data from northern, central, and southern Bekaa regions, which are predominantly agricultural areas in Lebanon. The data were collected from randomly selected 91 potato farmers. These data were exclusively on the socio-economic aspects of the use of irrigation technologies. A questionnaire was prepared, pretested and interviews were conducted by qualified persons in the field of farming systems research. The data were analysed using the SPSS computer program.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Farmers

21% of the farmers (N=91) had family members between one and four, 58% between five and nine, 18% between ten and fourteen and 3% had more than fifteen members in their families. The average family size recorded was seven. However, there was no indication that family size was related to the adoption of irrigation technologies. 4% (N=91) were illiterates, 49% could at least read and write and about 21%, 19% and 7% were at the intermediate, secondary and college levels respectively. A weak positive (not significant) relationship was observed between the farmer's level of education and the adoption of irrigation technologies. 8% (N=91) were less than thirty years of age, 39% between thirty-one and forty-five years, and 53% above the age of forty-six. 53% (N=87) were not members in agricultural cooperatives and the majority of the those who are members were less than four years in their associations.

Table 1 shows land tenure patterns by size of holding. In this table, 11% of the farmers (N=87) cultivated less than five hectares of land, and 60% less than fifty hectares. 82% of the farmers (n=91) had to rent-in land in different proportions and 64% had their own piece of land. Both total cultivated area and amount of personal piece of land were positively and significantly related to the adoption of irrigation technologies. Table 2 shows that 17% of the farmers (N=87) had no irrigation pumps, 60% had up to three pumps, about 15% up to six and the remaining 8% had more than seven pumps. Ownership of irrigation pumps was also positively related to the adoption of irrigation technologies.

Communication Patterns

The average farmer went to a nearby big city usually to Zahle and/or Beirut at least three times in a month, and read newspaper two times in a week as shown in Table 3. This table also indicates that the average farmer did not get chance to visit farm demonstrations and agricultural fairs at least once in a year. However, farmers visited research stations and were visited by either development or sales agents on the average five and twenty-four times in a production season respectively. It was also evident that most farmers did not participate in any kind of formal or informal committees in their communities. Positive but not significant relationships were observed between communication variables and the adoption of irrigation technologies.

Table 1: Land Tenure Patterns by Size of Holding and Number of Farmers.

Size of Holding in Hectares	Number of Farmers #	Number of Farmers %	Number of Farmers Operating on Rented Land #	Rented Land %	Own Piece #	Own Piece %
Less than 5	10	11	4	5	20	34
6-10	8	2	9	12	13	22
11-15	2	11	4	5	3	5
16-20	10	12	5	7	6	10
21-30	11	10	11	15	5	9
31-40	9	8	5	7	2	3
41-50	7	17	6	8	5	9
51-100	16	8	13	18	1	2
101-200	7	7	7	9	1	2
201-300	6	1	5	7	1	2
301-400	1	4	2	3	1	2
above 400	4		3	4	-	-
Total	91	100	74	100	58	100

Table 2. Number of Irrigation Pumps Owned by Farmers

Number of Pumps	Number of Farmers	Percent
Had No Pumps	14	17
1 - 3	52	60
4 - 6	13	15
7 - 9	2	2
10 - 12	2	2
13 - 15	3	3
16 - 20	1	1
Total	87	100

Table 3: Communication Patterns of Farmers (N=91)

Forms of Communication	Levels of Communication		
	Mean	Max.	Min.
- Member of times went to a near by big city per year.	44	360	0
- Number of times read newspaper per week	2.2	7	0
- Number of times visited (in a year):			
- Farm demonstrations	0.7	15	0
- Agricultural fairs	0.8	7	0
- Research stations	4.5	360	0
- Number of times visited by development or sales agents in a year.	24	204	0
- Number of village formal or informal committees in which the farmer is participating	0.1	5	0

Rate of Adoption of Irrigation Technologies

With the intention of rational use of irrigation water the technology in this regard advanced from the use of furrow to drip irrigation systems. The drip system is currently the most advanced form of irrigation available to farmers for economic use of irrigation water in the country. Table 4 shows the types of irrigation systems used by the farmers. In this table, 2.2% (N=91) did not use any kind of irrigation, 15.4% used furrow irrigation, 37.3% used sprinklers, 1.1% used drip, and the remaining about 45% used the three systems in different combinations. Table 4 also shows that 32% of the farmers adopted the drip irrigation system either in combination with sprinklers and furrow or drip alone.

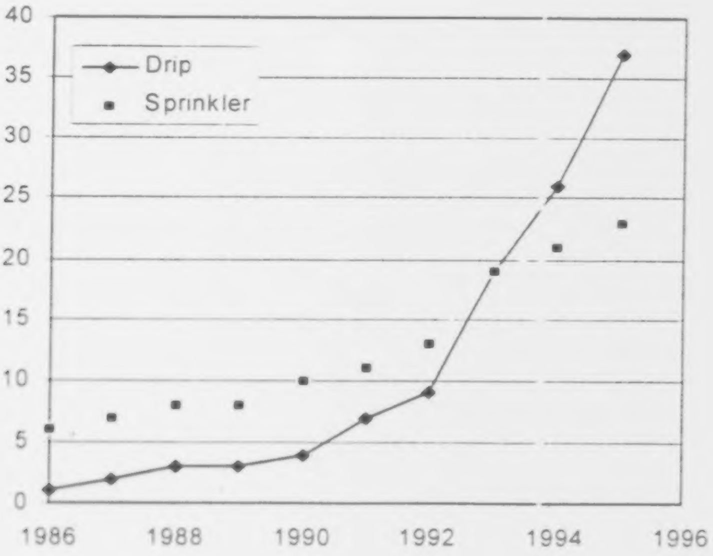
The cumulative frequency of farmers adopted drip and sprinkler irrigation system over a period of ten years (1986 to 1995) is presented in Figure 1. This figure illustrates that drip irrigation is gaining more importance than sprinklers particularly after 1993.

The factors affecting the rate of adoption of irrigation technologies was analysed by a set of eight independent variables as indicated in Table 5. The inter-correlation coefficients of the variables selected for studying the rate of adoption of irrigation technologies are shown in Table 6. In this table, all the independent variables selected were positively correlated with the adoption scores (the dependent variable) as expected . In particular, the adoption decision index, amount of cultivated land, number of pumps and amount of personal piece of land owned by the farmers were significantly correlated with the dependent variable.

Table 4. Number of Farmers by Type of Irrigation

Type of Irrigation	Number of Farmers	Percent
Furrow	14	15.4
Sprinkler	34	37.3
Drip	1	1.1
Combinations:		
Furrow an Sprinkler	12	13.2
Furrow and Drip	2	2.2
Sprinkler and Drip	13	14.3
Furrow, Sprinkler and Drip	13	14.3
No Irrigation	2	2.2
Total	91	100.0

Figure 1: Cumulative Number of Farmers Adopted Sprinkler and Drip Irrigation Systems (1986 - 1995)



Initially, a linear relationship of the variables as in equation 1 was assumed to best fit the regression model.

$$Y = \alpha + b_1X_1 + b_2X_2 + \dots\dots\dots\dots + b_8X_8 \qquad \text{(equation 1)}$$

When all the variables were regressed, the result was as in Table 7 where a significant $R^2 = .7870$ was obtained. However, only three of the independent variables, mainly the adoption decision index (X_1), number of times the farmer was visited by a development agent (X_4), and the amount of personal piece of land (X_6) were significant in the equation. When these three variables were separately regressed, the result was as in equation 2.

$$Y = -.61923 + 7.1788X_1 + .0027X_4 + .0054X_6 \qquad \text{(equation 2)}$$

Using equation 2, 77.66% ($R^2 = .7766$, $p<.01$) of the variance was accounted for by the three variables X_1, X_4 and X_6, and all the variables in the equation were significant ($p<.05$). However, using a backward elimination method, of all the variance accounted for by the three variables, the adoption decision index (X_1) alone contributed $R^2=.7574$ as shown in Table 8.

Table 5. Variables Selected for the Study of Adoption of Irrigation Technologies

X_1 = Adoption decision index*
X_2 = Total cultivated land
X_3 = Farmer's level of education
X_4 = Number of times the farmer was visited by a development or extension agent
X_5 = Number of irrigation pumps owned by farmer
X_6 = Amount of personal piece of land
X_7 = Number of times the farmer read newspaper per week
X_8 = Production level of potato (kg/ha)
Y = Adoption Score

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* $1/x$, ($x>0$), where x is the difference between year of adoption of current highest level of irrigation technology and year of awareness.

When adoption was considered without time factor, that is when the adoption decision index was eliminated from equation 1, the result was as in Table 9, where 22.30% ($R^2=.2230$, $p<.01$) of the variance was accounted for by the rest of the independent variables. The significant variables in this table are- amount of personal piece of land (X_6), number of irrigation pumps used (X_5) and number of times the farmer read newspaper per week (X_7). Thus, if time factor is not considered in the adoption process, the important variables to work with are X_5, X_6 and (X_7) and the reduced equation is as in equation 3.

$$Y = 1.4563 + .3024X_5 + .0089X_6 + .0843X_7 \qquad \text{(equation 3)}$$

Table 6. Inter-correlation Coefficients of the Variables Selected for the Study

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	Y
X_1	1.000								
X_2	.030	1.000							
	(.801)								
X_3	-.092	.161	1.000						
	(.439)	(.128)							
X_4	-.012	.155	.113	1.000					
	(.919)	(.143)	(.066)						
X_5	.347	.514	.122	.265	1.000				
	(.003)	(.000)	(.080)	(.013)					
X_6	.098	.464	.258	.092	.310	1.000			
	(.409)	(.000)	(.013)	(.384)	(.003)				
X_7	.038	.374	.608	.196	.305	.244	1.000		
	(.747)	(.000)	(.000)	(.063)	(.004)	(.020)			
X_8	.007	-.068	.082	-.075	.048	.040	-.0233	1.000	
	(.954)	(.525)	(.441)	(.474)	(.659)	(.707)	(.828)		
Y	.870	.215	.185	.127	.437	.251	.166	.012	1.00
	(.000)	(.042)	(.426)	(.234)	(.000)	.017)	(.118)	(.913)	

Note: The figures in parenthesis indicate probability values

Table 7. Multiple Regression of all the Variables Selected for the Prediction Model

Variable	B	SE B	Beta	T	Sig. T
X_7	.0388	.0787	.0384	.492	.6246
X_1	7.1788	.5411	.8494	13.265	.0000*
X_8	-2.7390	2.7558	-.0603	-.9940	.3242
X_4	.0027	.0034	.0489	.7830	.4366*
X_6	.0054	.0032	.1137	1.6710	.0999*
X_2	3.2155	.0014	.0164	.2150	.8307
X_3	.0725	.2055	.0266	.3530	.7253
X_5	.0100	.0589	.0129	.1700	.8654
(Constant)	-.6192	.6039		-.0250	.3092

R2 = .7870

Standard Error = 1.4240

F = 28.1786, Sig. F = 0000

*P< .05

Table 8: R^2 Changes of Selected Variables with a Backward Elimination Method

Equation Number	Variable(s) in Equation	Variable(s) not in Equation	R^2	R^2 Change	SE	F	Sign. F
1	X_1, X_4, X_6	------	.7766	------	1.4297	79.9627	.000*
2	X_1, X_6	X_4	.7738	.0028	1.4481	119 .7432	.000*
3	X_1	X_4, X_6	.7574	.0164	1.4689	221.6365	.000*

* P< .05

Table 9. Multiple Regression of Variables Without the Adoption Decision Index

Variable	B	SE B	Beta	T	Sig. T
X_7	.0843	.1383	.0814	.6100	.5436*
X_8	3.8778	5.0106	.0078	.0770	.9385
X_4	.0034	.0063	.0562	.5330	.9385
X_6	.0089	.0059	.1725	1.5030	.1369*
X_5	.3023	.1012	.3695	2.9870	.0037*
X_3	-.0451	.3573	-.0162	-.1260	.7166
X_2	-9.9583	.0027	-.0473	-.3640	.7166
(Constant)	1.4563	.9089		1.6020	.1131

R2 = .2230
Standard Error = 2.6568
F = 2.6568 Significant F = .0045

* p<.05

SUMMARY AND CONCLUSIONS

Socio-economic and communication data about farmers are presented in this study. These include data about family size, educational levels, age and membership status in cooperative associations. Moreover, land tenure and communication patterns from the stand point of cosmopoliteness, exposure to group and mass methods of information dissemination, and interpersonal communications are presented.

The study also includes reports on the number of irrigation pumps owned by farmers and the types of irrigation systems they use. A graphic presentation of rate of adoption of sprinkler and drip irrigation systems over a period of ten years (1986-95) is also reported.

Two scenarios are presented with regard to the adoption of irrigation technologies. First, if the rate of adoption of irrigation technologies is considered with time as a core issue, then, the variables to work with are adoption decision index, amount of personal piece of land, and the number of times the farmer was visited by a development agent (R^2 =.7870, p<.01)), with emphasis on the adoption decision index. This implies that action plans to increase the rate of adoption of advanced forms of irrigation technologies need to be directed toward reducing the time gap between first knowledge (awareness) of the technology and actual decision to adopt it. The adoption decision index to a large extent is a function of communication process. The other factors to be considered in determining the rate of adoption of irrigation technologies are improving land tenure patterns to increase the number of owner operators or make long-term arrangements with landlords, and improving the means to increase the number of visits of farmers by development and sales agents.

Secondly, if adoption decision index is disregarded from the prediction model (equation 1), the most important variables to work with are: amount of personal piece of land, number of irrigation pumps owned by farmers, and frequency of reading newspapers by farmers (R^2 =.2230, p<.01).

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Session E Instructional Technology

Session Chair - Mary Lou Carlson

Lincoln Room

TITLE: Teachers' Perceptions and Uses of Instructional Technology in Selected Vocational Agriculture Schools in Lithuania

AUTHORS: James J. Connors, University of Idaho
James A. Brousseau, Milan High School, Milan, Michigan
DISCUSSANT: Frank Bobbitt

TITLE: A Survey of Farmers' Extension Communication Needs in Zambia

AUTHOR: Robert A. Agunga, The Ohio State University
DISCUSSANT: Frank Bobbitt

TITLE: Computer Use by the Teaching Staff in the Faculty of Agriculture, University of Swaziland

AUTHORS: M. M. A. Dube, Roger C. Kuhn
University of Swaziland
DISCUSSANT: Frank Bobbitt

TITLE: Linking Learners with Communication: What International Agricultural and Extension Educators Can Do

AUTHORS: Naana O. Nti, K. Dale Layfield, Rama B. Radhakrishna, The Pennsylvania State University
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Teachers' Perceptions and Uses of Instructional Technology in Selected Vocational Agriculture Schools in Lithuania

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Introduction

On December 31, 1991 the Soviet Union ceased to exist. The disintegration of the largest country in the world sent shock waves through the educational systems of the newly independent countries of the former Soviet Union (FSU). One of those countries was the Baltic nation of Lithuania. Having lived under Soviet rule since 1940, the Lithuanian people were used to an educational system forced on them by the Soviet government. With independence, the Lithuanian's regained control over their educational system and the vocational schools located throughout the country.

Theoretical Framework

Under Soviet control, 40 vocational agriculture schools were organized throughout Lithuania to educate and train students to work in agricultural jobs on collective farms. Štuikys and Ladyga (1995) stated that, "Under the conditions of collective and state farming, sound investments were made in agriculture" (pg. 13). However, with the end of the Soviet Union, collective farms and the vocational agriculture schools were left to an uncertain fate. Many have launched new initiatives to improve the recruitment and retention of students into agricultural studies. Finley and Price (1994) wrote, "Training for agricultural occupations is thus provided in special establishments which issue their own diplomas, are seldom recognized as being equivalent to those of general education, and which do not permit access to other forms of higher education. Agricultural education is regarded, therefore, as an educational ghetto" (pg. 210).

Many schools are hampered by poor equipment and limited instructional materials. Almost six years ago, Birkenholz and Stewart (1991) reported that over 80% of the agriculture departments in the U.S. reported an equipment inventory which included an overhead projector, 73% of the departments had a microcomputer, 66% had a printer, 67% had a slide projector, 61% had a filmstrip projector and 56% had an audio-cassette player. Birkenholz and Stewart also found that in 1991, 6.3% of American agricultural education programs had an overhead computer projection unit.

Purpose and Objectives

The purpose of this study was to survey Lithuanian vocational teachers attending an inservice workshop conducted by the American Professional Partnership for Lithuanian Education (A.P.P.L.E.) to determine the current status of their vocational programs. Specific objectives included:

1. Determine the type of instructional equipment available in selected

vocational education classrooms.

2. Determine vocational teachers' ideas for changes needed in Lithuanian vocational education programs.

3. Determine vocational teachers' satisfaction with teaching since Lithuania gained independence.

4. Describe opinions of agricultural instructors and characteristics of Lithuanian vocational agriculture programs.

Methods

The population for this study was 26 teachers from Lithuanian vocational agriculture schools attending an inservice workshop conducted by the A.P.P.L.E. at the Alanta Agricultural School during July of 1996. Two surveys were developed and administered by the researcher. The first survey sought to determine the availability of instructional technology and attitudes of all 26 teachers concerning education in Lithuania. The second survey was administered to the 12 agricultural education instructors to determine programmatic and personal characteristics. Both surveys were checked for content validity by a team of American agriculture teachers conducting the inservice workshop then translated into Lithuanian by a professional interpreter/translator.

Results

The study found that a large majority of the respondents had slide projectors (69.2%) and overhead projectors (61.5%) available in their classrooms. Only two teachers (7.7%) had video cassette cameras to use for instructing their vocational classes.

One teacher had a 386 PC computer and three teachers reported they had 286 PC computers available in their classroom. None of the teachers had any 486 or Pentium (586) computers to use as instructional technology for educating Lithuanian vocational students.

Table 1

Equipment Available to Selected Lithuanian Vocational Teachers

Equipment	YES		NO	
	n	%	n	%
Slide Projector	18	69.2	8	30.8
Overhead Projector	16	61.5	10	38.5
Filmstrip Projector	12	46.2	14	53.8
Tape Recorder	8	30.8	18	69.2
Photographic Camera	6	23.0	20	77.0
Video Cassette Recorder	5	19.2	21	80.8
Video Cassette Camera	2	7.7	24	92.3

The Lithuanian teachers were almost evenly divided on their job satisfaction since Lithuania gained its independence. Twelve teachers (50%) stated their job satisfaction remained the same since independence, while ten teachers (41.7%) indicated their job satisfaction had improved. Only two teachers (8.3%) responded that their job satisfaction had declined. The following is a sample of the written comments from Lithuanian teachers related to their job satisfaction.

"You don't have to tell lies to your students (Soviet system politics)."

"I can choose the program and the number of lectures according to my own needs."

"The job doesn't depend on politics."

"Work of the teacher is free from politics, to develop student skills is the motto."

"Teachers are more self-confident and free."

The Lithuanian teachers who participated in the A.P.P.L.E. program were also asked to identify one thing they would change about their school if they had the chance. The following is a sample of the teachers' comments.

"I would change old specialties and I would introduce new technologies and experiments."

"I would increase the number of practical courses so students would get into the subject deeper."

"I would buy instructional materials, copy machine, video camera."

"More equipment and instructional materials. I would be able to prepare for my lessons better."

"We need Lithuanian instructional materials."

"Technical equipment."

Objective three of the study sought to describe opinions of Lithuanian agriculture instructors and characteristics of their vocational agriculture programs throughout Lithuania. Table 2 shows the agricultural subjects taught by the agriculture teachers who participated in the seminar.

Agriculture teachers were asked if the status of agriculture had improved, declined, or remained the same since Lithuania gained its independence from the Soviet Union. All 12 vocational agriculture teachers who attended the seminar agreed that the status of agriculture had declined over the years since independence. The following is a sample of the written comments concerning the status of agriculture in Lithuania. Most comments referred to the speed of which the Soviet collective farm system was destroyed.

"System of collective farms was destroyed too quickly."

"Old system is destroyed and NO finances to restore it."
"Too quick step from the state owned farms to privatization."
"No equipment and no finances."
"Lack of equipment"
"Because of the poor reform."

Table 2

Agricultural Subjects Taught by Lithuanian Vocational Agriculture Teachers

Agriculture Subject	N	%
Animal Science	2	16.7
Dairy Cattle	1	8.3
Beef Cattle	1	8.3
Sheep Production	1	8.3
Food Preparation	1	8.3
Plant Science		
Agronomy	1	8.3
Plant Technology	1	8.3
Machinery	1	8.3
Cultivation	1	8.3
Horticulture	2	16.7
Agricultural Machinery	1	8.3
Technical Engines	1	8.3
Traffic Teaching	1	8.3
Natural Resources		
Forestry	1	8.3
Environmental Science	1	8.3
Ecology/Ecosystems	1	8.3
Agricultural Economics, Law, and Management	1	8.3

The vocational agriculture teachers were asked to describe characteristics of their agricultural education programs. The mean number of students enrolled in their courses was slightly over 24. Teachers estimated that 46.5% of their students lived on farms, 58.3% of students were employed in an agricultural job and 45% of their students owned their own animals. Table 3 shows the means, standard deviations, minimum and maximum numbers for each characteristic.

Table 3
Agricultural Program and Student Characteristics

Characteristic	Mean	S.D.	Minimum	Maximum
Number of students enrolled in agriculture classes.	23.4	2.53	20	26
Percentage of students who live on farms.	46.5	26.8	8	75
Percentage of students employed in an agriculture job.	58.3	12.7	40	80
Percentage of students who own their own animals.	45.0	31.0	0	70

Teachers were also asked if they felt agricultural education was a higher priority under the Soviet government or under the current Lithuanian government. A majority of the written comments indicated that teachers felt the Soviet government placed a greater emphasis on agricultural education than the current Lithuanian government. One comment referred to the fact that under the Soviet government a student was guaranteed a job after completing his/her studies but now students become unemployed when they graduate.

Teachers were asked if they thought the ability level of their students had improved, declined or remained the same since independence. Sixty-seven percent (8) of vocational agriculture teachers felt the students' ability levels had remained the same. Four teachers thought students' ability levels had declined. Written comments about students' ability levels included:

> "The people are not conscious yet that education is the greatest value."
>
> "The people don't trust the government and the youth don't want to work."
>
> "Students don't see a bright future, their pessimistic. They lack self-confidence, we need a new generation which would grow up in the independent country."

Conclusions and Recommendations

Based on the results of this study the following conclusions have been developed:

1. Lithuanian vocational teachers are in need of additional inservice workshops to help them develop instructional materials and methods of teaching vocational subjects. Improved instructional materials and technology would help Lithuanian vocational teachers teach and students learn vocational concepts and skills.
2. Lithuanian teachers feel their job satisfaction is the same or better than

when they taught under Soviet control. However, all of the agriculture teachers thought the status of agriculture had declined since Lithuania gained its independence. A majority also felt that agricultural education was a higher priority under the Soviet government than under the current Lithuanian government.

3. Lithuanian vocational agriculture teachers felt that the ability level of the students enrolled in agricultural studies had declined since independence.

As a result of the findings and conclusions of this study the following recommendations have been developed.

1. Agricultural education workshops should be continued and expanded for Lithuanian vocational agriculture teachers. Workshops should concentrate on the development of new instructional materials that cover Lithuanian and Baltic agriculture and the use of instructional technology such as computer assisted instruction.
2. Lithuanian agriculture is in dire need of up-to-date modern technology to improve agricultural production. Steps should be taken to increase the instruction in modern agricultural machinery and technology to help students become familiar with the latest technological advances in agriculture.
3. More emphasis should be placed on entrepreneurship skills in vocational agriculture courses. Young students need the knowledge and skills to develop their own private agriculture businesses to improve their own livelihood and the economic well-being of Lithuania.

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A SURVEY OF FARMERS' EXTENSION COMMUNICATION NEEDS IN ZAMBIA

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Abstract

The Government of Zambia's commitment to small-scale farmer development is quite clear as shown in its Fourth National Development Plan (FNDP). The objectives the agricultural sector as stated in the FNDP include achieving a satisfactory level of self-sufficiency in the production of staple foods; expanding the production of export crops; and improving rural employment and incomes. To achieve these goals, the Government seeks to provide economic incentives to small-scale farmers and to intensify the role of extension in small farmer development. However, it appears that these policy objectives, no matter well-meaning they may be, are being pursued in a top-down fashion with little or no knowledge of what farmers' views are of the Ministry and its extension service. If farmers have a negative view of Extension it is unlikely that they will pay attention to their agents. A survey of farmers reveal what their impressions of the agricultural ministry are as well as their educational and material resource needs. The study found that the Ministry of Agriculture needs to rebuild its image among small-scale farmers if the task of increasing food production is to become a reality.

Introduction

Since political independence in 1964, Zambia and its Ministry of Food and Fisheries, in particular, has been the recipient of bilateral and multilateral assistance. Zambia's agricultural extension service has been a principal beneficiary of this aid because of its centrality to small-scale agricultural development (MOFA Report, 1991).

Two major reports outline the state of agricultural development in Zambia and the Government's plans to improve it. One is the Agricultural Sector Investment Programme (ASIP) written by Wanchinga and associates (1995) which focused on the importance of agricultural training. In an executive summary, the authors state the main objective of the Agricultural Training Sub-Sector as follows:

> Among the current challenges for the development of agricultural human resources is the need to develop the technical capacity to articulate issues of concern to the country and the region as a whole, and to initiate, design and implement programmes and projects that meet the needs of the country.
>
> Other challenges of ASIP will be the need to develop a critical mass of professionals and with a multi-disciplinary experience, to assure the quality and relevance of agricultural education through curriculum reform, intensification of practical skills and entrepreneurship and enhancing versatility. (p. iii)

The overall objective of the agricultural training sub-program, therefore, was to ensure that training institutions supplied a critical mass of suitably trained human resources to meet the needs of both the public and private sectors in a liberalized agricultural economy.

The other is the called the National Extension Plan produced by the Extension Branch of the Department of Agriculture (1991) focused on the need to improve the training of extension workers. In its "executive summary" the report noted the primary extension concern: .

> The proliferation of Donor funded projects over the last 15 years has led to a fragmented approach and an unbalanced pattern of investment. The Extension Action Plan attempts to highlight the key components for sound extension management and thereby facilitate the transfer of improved technology to all sectors of the farming community. In the present circumstances it is vital that assistance is focused on exploiting structures and human resources to the full. (p. 6).

These two reports, together, provide comprehensive information about agricultural development concerns in Zambia, particularly stressing the role of extension. The Extension report, for example, traced the history of extension in Zambia and the pitfalls of the strategies pursued.

For example, it noted that the extension problems began when many externally funded donor agencies were allowed to pursue their own agricultural development efforts independently under the umbrella of "projects." Examples donor independently pursued projects included the European Community Maize Project in Kabwe and the International Development Agency (a branch of the World Bank) sponsored agricultural development projects in Eastern and Central Provinces. The IDA projects, many of which were started in 1978, attempted to apply the Training and Visit System of Extension concept to extension management (See Benor and Harrison, 1977). After nearly 20 years of donors pursuing development activities in Zambia in a piecemeal fashion, it became apparent by the close of the 1980s, that "donor-assisted" projects cannot effectively improve the living conditions of small farmers unless these activities were coordinated in a systematic fashion by the Ministry of Food and Fisheries. The main problems with donor projects included the following (MOFA, 1991):

1. A diversity of methodologies in the same field of work;
2. The erosion of Government control and involvement in areas dominated by donor projects;
3. The absence of a clearly defined interface between research and extension;
4. An imbalance in the quality and scope of extension services within and between provinces; and
5. A decline in the morale of Zambian extension workers outside the donor funded projects.

In an attempt to resolve this problem of donor proliferation of the extension service, the MOFA commissioned a study leading to the development of the "Extension Action Plan" report of 1991, referred to in this report as "MOFA, 1991." The overall objective of the plan was to establish an effective extension system that is cost efficient and well-suited to Zambian conditions. The general framework included the following:

1. Establishing a national monitoring and evaluation unit to assess the performance of extension projects including donor funded ones in relation to overall national agricultural development priorities;
2. Reforming the "contact farmer" into a "contact village" approach whereby the emphasis is on delivering extension information to the group instead to individuals;

3. Improving the linkage between research and extension; and
4. Establishing provincial media units to respond rapidly to extension requirements and support annual programs.

Background to Extension in Zambia

According to MOFA Extension Report (1991), agricultural development in Zambia long has been influenced by the discovery of copper in the 1900s and the industrialization of the country's Copperbelt. Crown land along the rail line was reserved for settlement by European farmers who were encouraged to pioneer commercial farming to feed the expanding urban labor force. The primary agricultural production activities were maize and beef.

Apart from the commercial European farmers, traditional food and livestock producers also existed; however, only the elderly were left to till the fields and tend to the livestock as the young men and women went to work in the copper fields or industrial operations in cities. Cattle production was restricted to a limited number of tribal groups in the Southern, Eastern and Western Provinces. The main agricultural development problems by 1940 were as follows:

1. Excessive settlement and overgrazing in some native reserve areas;
2. Compression of slash and burn systems in Northern Province due to urban migration;
3. Need to involve traditional farmers in the cash crop economy; and
4. Need to improve the performance of some cash crops through research.

To address these problems, the Government had, dating back to the 1920s, taken the following measures:

1. Establishment of the Department of Agriculture;
2. Introduction of compulsory conservation measures in areas that required contour ridging;
3. Employment of guards to enforce conservation measures and to encourage farmers to incorporate kraal manure into their fields.
4. Legislation to encourage what were considered sound farming systems;
5. Establishment of research centers to improve crops grown by commercial farmers; and
6. Establishment of an extension service to promote improved agricultural practices.

Until independence, extension work in Zambia was limited to the more productive areas and with progressive European farmers producing cash crops. Before independence in 1964 also, agricultural development in Zambia (and associated extension service) was divided into two types: "African" and "European" agricultural developments. However, after independence, the two-tier agricultural services were dissolved and the Department of Agriculture undertook responsibility for extension and research on a national basis.

The First and Second National Development Plans, that is, agricultural development policies of the 1960s and 1970s tried to promote agricultural production by the establishment of: a) a national cooperative movement to support producer cooperatives with tractors and other resources; and b) managed settlement schemes on state and cooperative ranches and dairy farms utilizing mechanized technology.

The Third National Development Plan launched in 1979, however, tried to shift the emphasis from cooperatives to small holder subsistence farmers and the Fourth National Development Plan further built on the need to empower small-scale producers by endorsing policies aimed at developing and disseminating appropriate technological packages.

The T & V System of extension management was adopted as a means of conveying innovations to farmers and adaptive research was emphasized as an appropriate linkage among research, extension and farmers.

Since 1991, the Government has classified farmers in Zambia into three main categories: Large scale (50 acres or more), medium scale (11 - 40 acres) and small-scale (10 acres or less). Based on this classification, it was found that small-scale holders constitute about 90 percent of land holdings. The small-scale holders predominate in all provinces, from 70 percent in Southern to almost 100 percent in Luapula. The main focus of small-scale agriculture was food production to meet domestic subsistence needs of the farm household with minor involvement in formal marketing. Thus, the agricultural development policy of the government in the 1990s has been to give priority to small-scale farmer development. The main food crops grown in Zambia include maize, sorghum, cassava, millet, rice, groundnuts, soybean, and beans while the cash crops include cotton, coffee, sunflower and oilseed. Livestock consists of mainly beef cattle.

Research Problem

The Government of Zambia's commitment to small-scale farmer development is quite clear as shown in its Fourth National Development Plan (FNDP). The following objectives are set for its agricultural sector :

1. Achieving a satisfactory level of self-sufficiency in the production of staple foods;
2. Expanding the production of export crops;
3. Increasing the import substitution of agricultural products; and
4. Improving rural employment and incomes (Ministry of Agriculture, 1991).

To achieve these goals, the Government seeks to provide economic incentives to small-scale farmers, the overwhelming majority of farmers. The problem, however, is that little no information exists on the plight of the small-scale farmer in Zambia. In spite of all the policy changes and the emphasis on small farmer development, including the stress on small-farmer participation, the researcher cannot find information indicating that a study has been undertaken aimed at understanding the real needs and concerns of these farmers or how they would like to become involved in the agricultural development decision-making process.

Yet it is clear that without this information policy makers will continue to make assumptions about farmers needs and problems from a top-down approach, which, no matter how well-meaning, may not really address farmers' concerns. A systematic approach to sustainable, small-farmer sector, agricultural development in Zambia requires a baseline survey which will elicit information from a random group of small farmers. What are the main problems facing small-scale agricultural operators in Zambia? How effective is Extension in reaching and involving these farmers in educational programs? What government agencies, other than Extension, are reaching these farmers? What communication channels exist for working more effectively with them? Answers to these questions are central to developing a suitable extension strategy for Zambia. This study was undertaken with these concerns in mind.

Purpose and Objectives of this Paper

As noted above, small-scale farmers constitute about 90 percent of the farming population in Zambia, the backbone of the nation's agricultural economy. If the government's national development policy is to become a success, then the majority of farmers must embrace it. However, small-scale farmers cannot effectively participate if their needs and concerns are not the focus of extension decision-making. Therefore, the main purpose of this study was to make farmers' needs and concerns known to Extension administrators. This study was a part of more comprehensive study aimed at determining the overall capacity-building needs of the MOFA. The specific objectives were:

1. To obtain demographic information on the farming population;
2. To determine farmers' access to innovations in agriculture and allied areas;
3. To determine what mass media channels are accessible to farmers;
4. To examine problems farmers face; and
5. To determine farmers' needs from the Government.

Research Methodology

Given the vast area of Zambia and limited resources, only 109 small-scale farmers participated in the study for financial reasons. The study was conducted in four districts in four out of nine provinces of Zambia which were known to have large populations of small-scale farmers. The provincial directors helped select the district while the district officers helped select the villages. In each district, 30 farmers were selected based on accessibility although attempts were made to reach farmers in extremely remote locations. Face to-face interviews were conducted using an interview schedule developed by the researcher. It was pilot-tested with African graduate students and faculty familiar with Zambian agriculture. The interview schedule was further refined based on comments from Zambian extension officials. Field data gathering took two weeks and involved four interviewees working in pairs. Data analysis and reporting were done at Ohio State using a Statistical Package for the Social Sciences (SPSS) on Macintosh Computer.

Results

Findings of the study are reported as follows:

Objective 1
To Obtain Demographic Information on the Farming Population

For effective agricultural development in Zambia, it is important to have demographic data on the farming population, such age, farm size, literacy, family size and gender. For example, literacy is helpful in selecting a communication strategy for extension campaigns. The study showed that the vast majority of farmers were male (84.3%) although the 15.7% population of female farmers is considered significantly high to deserve attention. Ages ranged from 36 to 60 years. The majority of respondents were married (88.9%), 4.6%) were divorced, and 1.9% widowed. Thirteen percent of respondents were polygamous, that is, had anywhere between two and six wives. Sixty-six percent had only one wife whereas 22% were not married. About 80% of respondents had 3 or more children and nearly 20% had 9 or more children. However, less than 36% had children in school and still less than 10% had 3 or more children in school compared to 80 percent who had 3 or more children. It would appear that the majority of children were on the farm instead of school. About 95.4% had at least three people helping on the farm. Surprisingly about 97% of respondents had at least Grade 1 education and nearly 44% had Grade 8 or better education.

Eighty-nine percent of respondents were small-scale farmers, that is, had 10 acres or less; 9.2% were medium-scale farmers (had 11-40 acres) and hardly anyone was a large-scale farmer (41 acres or more). These showed that the districts selected for the study clearly represented areas of small-scale farmer population. The majority of farmers do not use permanent hired labor (94.5%); however, about 69% indicated using casual labor and 33.3% exchanged labor, that is, helped others and received help in return.

Objective 2
To Determine Farmers' Levels of Innovativeness

Innovativeness is defined as the extent to which a farmer is early than his or her neighbors in adopting a new idea, practice or product (Rogers, 1996). Eighty-three percent of respondents had ever used chemical fertilizer and 62.4% ever adopted fertilizer (see Table 1). Ninety percent had

Table 1
Level of Innovativeness of Small-Scale Farmers in Zambia

Type of Innovation Adopted	Number of Farmers Used	Percentage of Population
1. Chemical fertilizer	91	84.3%
2. Farm tractor	6	5.6 %
3. Ox-plough	70	64.8%
4. Pesticides	31	28.7%
5. Vaccinated cattle	41	38.0%
6. Hybrid corn seed	88	81.5%
7. Loans from Government	43	39.8%
8. Television (owned/access to)	8	7.4%

9. Computer	0	0.0%
10. Aluminum roofed home	38	35.2%
11. Own or has access to radio		7872.2%
Total number of farmers surveyed	109	

never used a tractor, however, 64.2% had ever used an ox-plough. The majority (68.9%) had never used pesticides and 59.8% had never vaccinated their cattle. However, 80.7% had ever used hybrid corn seed. About 80 percent were aware of government loan programs but only 45% tried to obtain loans and still fewer (39.4%) were successful in obtaining them. Hardly anyone ever borrowed money from local lenders who often charged extremely high rates.

About 7% had access to television, none had a computer, 64% slept under grass-roofed huts, yet 72.2% had access to radio. Although not included in the table above, 70% of respondents had bank accounts but 98% had no access to piped water, electricity, bus/car or VCR. Also, about 40% belonged to organizations such as a credit union or parent/teacher association.

Objective 3
Level of Extension Contact

The level of extension contact is a large indicator of farmers' access to information on farming. Therefore, questions were asked on farmers' contact with extension agents of development ministries/departments such as crop extension, livestock extension and social work. Farmers were asked to indicate the type of extension agents who visited them and whether they found the visits useful. Crop extension agents visited 62.0% of respondents; animal husbandry visited only 19.4%; veterinary services, 24.8%; family planning, 30.6%; home economics, 19.3%; social work, 12.0%; planning and evaluation, 12.0%; and horticulture and environment officials, 16.5%. The percentages of farmers visiting these institutions were equally small. For example, 20% said they had visited veterinary officers, compared to 24.6% of veterinary agents who visited their farmers. The study showed that there was very limited contact between farmers and extension workers and hence, a need to increase the level of interaction at the extension/farmer interface.

Objective 4
To determine Mass Media Channels Accessible to Farmers

Considering the high cost of transportation for extension workers, mass media channels can be used to augment extension visits to farmers and thereby reducing the cost of providing extension services. Therefore, the research objective was to determine mass media channels available to farmers. The study found that radio was an extremely popular medium of communication available. About 72% of respondents either had their own radios or access to radio. About 50.0% of respondents listen to radio everyday, another 20% listen most days and 15.0% listen once a month to once a week. Only 13.8% said they never listen to radio. Computers, television and/or VCRs were hardly available. Thus, radio serves as the most popular medium for mass communication with farmers. Given that over 87 percent of respondents had, at least Grade 1 education and 80 percent with Grade 5 education or better, it was possible also to use print as a medium of mass communication. Finally, interpersonal communication is used by virtually all extension workers. Many of the farmers (70%) found the visits by extension agents useful although 30% found the visits not useful. Why 30% of the people studied did not find extension useful requires serious attention. Could it be that the Extension agents had no new or useful information for them?

Objective 5

To Determine Farmers' Needs from Government

A number of open-ended questions, farmers were asked to indicate their needs, problems and concerns. These needs could be grouped into four main areas: 1) inputs or material needs; 2) educational or training needs; 3) activities of the Extension agent; and 4) activities of the Ministry of Agriculture.

1. Input or Logistical Requirements

The overwhelming majority of respondents expressed need for the following inputs: a) fertilizer, b) ox-ploughs, c) improved seed varieties, and d) loans to help them purchase inputs. They noted that where fertilizer is available it is delivered late to be of any use. Transportation and marketing of farm produce were also raised as serious issues facing farmers. They noted that spare parts for ox-ploughs and donkey carts were unavailable.

2. Training Needs

Farmers indicated a need for training on better methods of crop and livestock production. Poultry keeping, fish farming, maize production, fertilizer application, crop rotation, and potato production were frequently mentioned as areas in which they needed training. However, it appears that the need for social science training such as how the community can be mobilized to take action to help itself was not perceived as a need.

3. Activities of Extension Agents

Although many farmers appreciated the services provided by extension agents, there were some who felt that their agents could do much more to help them. For example, statements such as "he is committed to his work but does not help us," "he is not committed to work," "he should be more encouraging than he is now. He does not seem to be so committed to his duties," "He is not frequent in his visits farmers have to constantly visit him to get help" and "He is about to retire so he does not care much about farmers" were expressed. Clearly there is a need to build the image of the extension agent as the farmers' helper.

4. Attitude Towards the Ministry of Agriculture

Farmers explained great dissatisfaction with the Ministry of Agriculture for several reasons including complaints like: "Irregular visits of extension agents," "They don't assist us in anyway," "They don't fulfill their promises," and " The Ministry does not consider small farmers." Clearly, the Ministry has an image problem to address.

Summary of Findings and Implications

This study has raised many important issues which the Ministry of Agriculture must consider

if the objective of increasing small-farmer productivity is to become a reality. In particular, MOFA must improve its image with the farmers for, without trust, Extension messages will not be accepted. Also, while many Extension agents appear to be committed to their jobs, it is clear that farmers are demanding improved services from them. The fact that 30 percent of those studied do not find extension visits useful poses an major concern. Finally, farmers have expressed a need for inputs, such as fertilizer, seed and ox-ploughs. These inputs are crucial to increased productivity and should be seriously considered. Perhaps alternative inputs, such as organic matter for chemical fertilizers should be promoted to help conserve limited foreign exchange. Organizing farmers to become their own decision makers is an effective way to promoting self-sustainability in agricultural development. Extension has a major task for mobilizing farmers for their own development.

Educational Importance

Many Extension studies have glossed over the importance of the small-scale farmer as a major source of agricultural development. For example, these farmers are rarely asked what their needs and problems are; as a result projects are "dumped" on them in a top-down fashion, often resulting in failure. By building extension programs on farmers' real needs, they are likely to participate actively. Empowerment, as a development concept refers to beneficiary involvement through effective needs assessment. This study, therefore, has offered baseline data as the bases for effective extension program planning and implementation in Zambia.

References

To be provided

Computer Use by the Teaching Staff in the Faculty of Agriculture, University of Swaziland

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INTRODUCTION

In recent years, there has been an increasing realization that computer use in educational institutions, private industries, and government institutions is extremely essential (Malpiedi el at, 1985; Moore, 1985; Henderson, 1985; Blom and Smolernaars, 1994; Watson, et al, 1992). Computer use is important particularly in facilitating communication within and between institutions and even worldwide.

According to Miller and Foster (1985), the use of microcomputers in everyday life and in the future in education and agriculture is considered to be increasing daily in the United States of America. Miller and Foster further (1985, p.1) quoted Luerhmann to have asserted that:

> "the ability to use a computer is as basic to a person's formal education as is reading, writing, and arithmetic".

Watson et al (1992) in the editors' note stated that The International Conference on Computers in Agricultural Extension Programs was convened to hi-light the work of professionals, related to the use of computers in agriculture. In this conference, three major objectives were advanced: 1. To present computer-related development in research, teaching, and extension technologies that are adaptable to the implementation of agricultural extension programs, 2. To facilitate communication among those involved in the development, delivery, and use of computer technologies in agriculture, and 3. To identify needs and directions for the implementation of computer technologies in agricultural extension.

While the importance of computer use is widely recognized, many basic questions have been left unanswered. According to Henderson (1985), some of these basic questions on the use of microcomputers include the following:
1. How are instructors using computers in the classrooms?
2. How can they (instructors) ensure equity of access to a limited number of computers? 3. What are the barriers to computer use by teachers? and 4. How can these barriers be

overcome?

In the Faculty of Agriculture, University of Swaziland, many computers have been purchased to be use for teaching purposes. Also, they are used by students to analyse data on their research projects. The old computers were bought through UNISWA and CAPM, and the new ones were bought by UNISWA through the equipment budget. These computers should be used as instructional devices, for word processing, data analysis, graphics, and for electronic correspondence.

The potential use of computers by the Teaching Staff in the University of Swaziland cannot be improved unless we know the current level of competence and interest in the learning computer skills. Empirical evidence regarding the Teaching Staff's use of computers is lacking. This study therefore, attempts to establish just that, as a basis for recommendations.

PURPOSE AND OBJECTIVES OF THE STUDY

This paper sought to compile baseline information on computer use by the Teaching Staff in the Faculty of Agriculture, University of Swaziland.

Specifically, the study will attempted to:

1. Determine information regarding Teaching Staffs' use of computers in the Faculty of Agriculture, University of Swaziland.
2. Establish the sources of computers used.
3. Determine the purposes for which the Teaching Staff used computers.
4. Establish the Teaching Staffs' interest in using computers.
5. Determine the level of interest in learning how to use computers, and to
6. Determine constraints faced by Teaching Staff in using computers in the Faculty of Agriculture, University of Swaziland.

METHODOLOGY

The used a descriptive design. The target population was all the Teaching Staff in the Faculty of Agriculture, University of Swaziland in 1996 (N=40). The study was a census. Therefore, selection error was not a threat in this study.

A self-administered questionnaire was developed, reviewed for content and face validity by a panel of experts in the

University of Swaziland. The questionnaire was pilot tested to establish its reliability. The reliability coefficients were: .96, .91 and .89 for the teaching staff's interest in using computers, teaching staff's level of interest in learning how to use a computer, and teaching staff's level of satisfaction with the use of computers domains. Frequencies, Percentages, means and standard deviations were used to analyse data.

A follow-up was made to improve response rate. Twenty-six (65 Percent)out the 40 teaching Staff responded. Thus generalization of these results was made to 65 percent respondents who returned usable questionnaires.

To respond to the questionnaire, a Yes/No type of response what used for domain I. In part II, the respondents were asked to tick against appropriate items. In part III, IV, and V, a Likert type scale of 1-6 was used to indicate their interest in using computers, level of interest in learning how to use computers and level of satisfaction with the use of computers. The Likert Scale is explained under each Table.

Theoretical Framework

This study builds on the premise that the value of computers as instructional devices, for word processing, data analysis, graphics, and for electronic correspondence is widely accepted (Blom and Smolenaars, 1994 and Moore, 1985). It is through the use of computers (as a new technological advancement) that communication within and between institutions, and worldwide can be enhanced.

RESULTS

The findings of this study were organized and presented according to the objectives which guided the study. Conclusions and recommendations of the study are presented.

Information regarding Teaching Staff use of computers in the Faculty of Agriculture

In Table 1, information regarding Teaching Staff use of computers in the Faculty of Agriculture is presented. A great majority (88.5 %) of the Teaching Staff indicated that they were using computers. Further that about 61.5 percent were using computers at their homes for doing Faculty business.

Table 1. Information on the number of Teaching Staff using computers in the University of Swaziland

Item	Yes		No	
	N	%	N	%
1. Use a computer in Faculty of Agriculture	23	88.5	2	7.7
2. Use a computer at home for Faculty business	16	61.5	7	26.9

Sources of computers used by the Teaching Staff in the Faculty of Agriculture

The Teaching Faculty was asked to indicate information on the sources of computers they use in the Faculty of Agriculture. As can be observed from Table 2, nearly half of the respondents (46.2 percent) were using their personal computers or used computers from other sources. On the other hand, about 61.5 percent, 57.7 percent and 65.4 percent of the respondents claimed that they were not using the computers in 1.the Faculty Computer room, 2. the faculty's laptop in their offices, and 3. Using a friend's computer.

Table 2 Sources of computers used by the Teaching Staff in the Faculty of Agriculture

Item	Yes		No	
	N	%	N	%
1. Use a computer in Faculty computer Room	5	19.2	16	61.5
2. Use Faculty's laptop in my office	6	23.1	15	57.7
3. Use own personal computer	12	46.2	10	38.5
4. Use a friend's computer	3	11.5	17	65.4
5. Use a computer from other sources	12	46.2	9	34.6

Purposes for which Teaching Staff use computers in the Faculty of Agriculture

Information pertaining to the purposes for which computers were used by the Teaching Staff in the Faculty of Agriculture was sought.

As can be observed in Table 3, a great majority of the respondents indicated that they were using computers mainly for word processing (73.1 %). The second and third most popular uses of a computer included: 1. Computer games (50%), 2. Data analysis and processing students grades (42.3%), and 3. Electronic mail for correspondence and literature search (30.8% each).

Table 3. Purposes for which Teaching Staff use computers in the Faculty of Agriculture

Item	Frequency	
	N	%
1. Word Processing	19	73.1
2. Data analysis	11	42.3
3. Making graphics	6	23.1
4. Electronic mail	8	30.8
5. Literature search	8	30.8
6. Computer games	8	30.8
7. Processing grades	13	50.0
8. Instructional purposes	3	11.5

Teaching Staffs' Interest in Using Computers in the Faculty of Agriculture

In Table 4, information on the Teaching Staffs' interest in using computers is presented.

As can be observed from the Table, the Teaching Staff indicated great interest in using computers for 1. word processing, 2.data analysis, 3.electronic mail, 4. literature search, 5. processing grades, and 6. instructional purposes. However, the respondents indicated less interest in using computers for playing computer games.

Table 4. Teaching Staffs' Interest in Using Computers in the Faculty of Agriculture

Item	N	Mean	Standard Deviation
1. Word processing	25	5.68	1.03
2. Data analysis	24	5.83	0.38
3. Electronic mail	23	5.83	0.39
4. Literature search	24	5.83	0.48
5. Computer games	19	2.79	1.87
6. Processing grades	23	5.04	1.36
7. Instructional purposes	21	5.71	0.56

Rating Scale:
1=Very Uninterested
2=Uninterested
3=Slightly Uninterested
4=Slightly Interested
5=Interested
6=Very Interested

Level of Teaching Staffs' Interest in Learning How to Use Computers in the Faculty of Agriculture

The Teaching Staff were asked to indicate their level of interest in learning how to use computers in the Faculty of Agriculture.

Information on how the respondents indicated their level of interest in learning how to use computers is presented in Table 5. The respondents showed high level of interest in learning how to use computers for 1. Electronic mail correspondence, 2. Literature search, 3. Data analysis, 4.instructional purposes, and 6. Processing grades. Less interest was reflected on learning how to use computers for playing computer games (mean=2.78).

Table 5. Level of Teaching Staffs' Interest in Learning How to Use Computers in the Faculty of Agriculture

Item	N	Mean	Standard Deviation
1. Word processing	22	4.41	2.11
2. Data analysis	24	5.33	1.44
3. Electronic mail	22	5.59	1.10
4. Literature search	24	5.54	1.06
5. Computer games	18	2.78	1.83
6. Processing grades	22	4.23	1.82
7. Instructional purposes	23	4.96	1.64

Rating Scale:
1=Very Uninterested
2=Uninterested
3=Slightly Uninterested
4=Slightly Interested
5=Interested
6=Very Interested

Level of Satisfaction of Teaching Staff in using computers in the Faculty of Agriculture

Information pertaining to the Teaching Staffs' level of satisfaction in using computers in the Faculty of Agriculture is presented in Table 6.

As can be observed from the Table, the Teaching Staff indicated high level of satisfaction regarding their: 1. Ability to use available computer programmes, 2. Knowledge of computer use, 3. Number of computers available for staff use, 4. Opening hours of the computer centre, and 5. Time available to use computers. Regarding the remaining items, the respondents were slightly satisfied to being slightly unsatisfied with these items whose mean scores were 2.55, 3.42 and 3.44, respectively.

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Table 6. Level of Satisfaction of Teaching Staff in using computers in the Faculty of Agriculture

Item	N	Mean	Standard Deviation
1. Number of computers	22	3.83	1.59
2. Knowledge of computer use	24	4.09	1.54
3. Time to use computers	22	3.78	1.59
4. Ability to use available Computer programmes	24	5.10	1.17
5. Proficiency in using Available computer Programmes	18	3.41	1.71
6. Opening hours of the Computer centre	22	3.81	1.62
7. Ability to fit computers in my class	23	3.44	1.71
8. Computer expertise to Develop application packages	11	2.55	1.57

Rating Scale:
1=Very Unsatisfied
2=Slightly Unsatisfied
3=Unsatisfied
4=Slightly Satisfied
5=Satisfied
6=Very Satisfied

CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

A great majority of the Teaching Staff in Faculty of Agriculture use computers. These results confirm the recent realization that computer use in educational institutions is of paramount importance. Also, a large number of Teaching Staff even use computers at their homes to do Faculty business.

Computers are potentially used for various purposes as revealed in the findings of this study. Such results confirms what was reported in The International Conference on Computers in Agricultural Extension Programs (Watson et al, 1992).

The Teaching Staff in the Faculty of Agriculture is very keen to use computers. The Teaching Staffs' level of interest in learning how to use computers confirms their keenness. It is not surprising to observe such enthusiam among the Teaching

Staff in using computers. Luerhmann in Miller and Foster (1985,p.1) stated that:

> "The ability to use a computer is a basic to a person's formal education as is reading, writing, and arithment"

Clearly, learning how to use a computer is extremely essential particularly to professionals like the Teaching Staff in the Faculty of Agriculture.

The Teaching Staff in the Faculty of Agriculture depicted high level of satisfaction in using computers. This being the case, what are potential barriers to the use of computers by Teaching Staff? According to Henderson (1985), all the potential barriers should be curtailed.

From the results of this study and based on the comments of Teaching Staff in the Faculty of Agriculture, the following recommendations are forwarded:

1. Efforts should be expended to nurture and promote the use of computers in the Faculty of Agriculture sponsoring and organizing computer workshops for the Teaching Staff to help everyone to develop skills and expertise in using computers for various purposes.

2.As new computer softwares are constantly being developed, workshops should be organized and conducted in consultation with the computer companies. Such an effort will allow computer users to develop the necessary expertise to use these new software.

3.The introduction of the electronic mail system has made communication even much quicker. In the era of electronic correspondence, professionals will be able to exhange information cheaply and faster. Therefore, every potential user of the electronic mail should be kept abreast and ready to join the network communication process.

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Linking Learners with Communication Technologies: What International Agricultural and Extension Educators Can Do

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Linking Learners with Communication Technologies: What International Agricultural and Extension Educators Can Do?

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Introduction

Telecommunication technologies are offering agricultural and extension educators more opportunities than ever before to extend programs to diverse and dispersed audiences. Using videos, print, satellite communications, and computers or a combination of these media, agricultural and extension educators are increasingly delivering programs to large numbers of learners with diverse backgrounds and in different locations (Nti & Thomson, 1996; Miller & Honeyman, 1993). The Ag Ed Network uses computers to provide agriculture teachers with up-to-date information on agriculture (Peal, 1994). The Agricultural Distance Education Consortium uses satellite technology to deliver educational programs on diverse topics to learners as well as the general public (AG*SAT, 1993). Communications technologies are helping agricultural and extension educators in the United States deliver instruction to students in different parts of the country as well as overseas. These technologies are also linking learners and instructors from different countries and enabling students who would otherwise not have access to certain types of expertise to get them. Several universities in the United States are involved in teaching across national boundaries through distance education. For example, Moore (1993) described a course he taught to eighty five learners in eleven cities in six countries and on three continents all connected by a telephone and an audio bridge. The African Virtual University is using satellite technology to deliver engineering courses from an American university to students in six African countries. (Chronicle of Higher Education, 1997).

When educators can reach learners and clientele in different parts of the world, the opportunities for providing excellent education to diverse learners and in an efficient manner are almost endless. However, the different technical, institutional, pedagogical, financial, and other conditions existing at the various sites pose many challenges to educators teaching distant learners. These challenges were recognized by distance educators at the 1994 international distance education conference held at The Pennsylvania State University. (Moore & Kearsely, 1996). Participants at this conference agreed to promote, among other things, "greater understanding of the cultural, linguistic, pedagogic, administrative, and technological issues associated with studying across national boundaries" (p. 228).

Purpose

The purpose of this paper is to highlight some benefits and challenges to international agricultural and extension educators for delivering instruction to audiences in international settings and to suggest steps that they can take to overcome some of the challenges. Using a case study from an agriculture class as an illustration, we discuss some of the benefits accruing to the learners as well as their difficulties. We also provide some suggestions about what agricultural educators can do to make programs effective. The experiences of the learners provide some useful insights to educators, especially in international situations, who want to use communications technology to teach learners in a global context.

Background

An agricultural science course using a combination of communications technology and face-to-face instruction was taught to senior undergraduate and graduate learners at two universities in the United States. Learners at one university were taught face-to-face. Learners at the other university received the same course simultaneously through interactive video. The instructor and learners from both universities interacted in class through interactive video. Course materials, and assignments were accessed through the World Wide Web. Electronic mail was used to submit assignments and communicate with the instructor outside the classroom.

Methodology

Data were collected from 40 students (30 at the originating site and 10 at the remote site) via focus groups. The students were divided into four focus groups, each with a moderator and a recorder. Questions designed to elicit feedback on the use of interactive video, the World Wide Web, and electronic mail in the course were posed to the students. Each focus group discussion was recorded and later transcribed and analyzed. The following questions were posed to the students:

What are your views about the use of interactive television in this course?

What are your feelings about the use of the Internet for the course?

Were you adequately trained to use the equipment and materials in the course?

Results and or Conclusions

Feedback from the students indicated that they found the approach beneficial but they also had some difficulties with the approach. The benefits and difficulties are discussed in detail below.

What are your feelings about the use of interactive television in this course?

Students enjoyed interacting with students from another university and the opportunity to interact with an instructor considered an expert in the field. As one participant put it, *"the most interesting part of it was seeing a different school's perspective."* Students also reported a high rate of learner-learner interaction and a high level of peer support.

Students at the originating sites felt that they would have liked to have more interaction with the distant group. Students at the distant sites also felt neglected by the instructor during the instructional period and their counterparts at the originating sites agreed and empathized with them.

What are your feelings about the use of the Internet for the course?

Some students reported that they enjoyed the electronic mail and World Wide Web aspects of the course. Students who enjoyed the electronic mail and World Wide Web aspects of the course were highly motivated, had computer skills, or had accepted the use of technology education and had decided to learn to use it. Students from both sites acquired useful computer skills.

Many students from both sites had difficulty with the electronic mail and World Wide Web part of the course. Students' difficulties were due to lack of adequate training, equipment incompatibility, lack of access to equipment, and technical difficulties. One student said about the electronic mail, *"when it works it's great, when it doesn't it sucks."*

Were you adequately trained to use the equipment and materials in the course?

Most students felt they had not been adequately trained to use the equipment and the software. Students felt they should have received more training at the beginning and continuously during the course. One student mentioned that *"in the beginning of class they went over real quick and they showed you how to do it, what to access, but there's just so many things that come up."*

Teaching students in a combination of face-to-face and technology mediated class can offer many rewards to students. In the above case the distant students had access to a course that was otherwise unavailable to them. Students at both sites exchanged ideas with each other and enjoyed getting different perspectives on issues. They also acquired useful computer skills, interacted more with their peers, and helped each other. Lack of adequate training, and access to the needed equipment led the students to feel frustrated about the technology. Lack of attention to the distant students was also a major problem.

What International Agricultural and Extension Educators Can Do

Perhaps the greatest beneficiaries of the new communications technologies are people engaged in international work. The results of the study present some useful insights for international agricultural educators. With the appropriate technology and the right preparation, international agricultural educators can deliver effective instruction to students in any part of the world, collaborate with educators in other countries to teach and conduct research and do so cost effectively. International agricultural educators should recognize however, that success in delivering instruction to students and other clientele abroad will come only when such programs are designed carefully taking several factors into consideration. The challenges faced by the students in the agriculture class in above case were mostly technical, logistical, and pedagogical. Most of the technological, logistical, and pedagogical challenges are faced by educators delivering instruction to distant students within their national boundaries. However, the challenges become exacerbated when the instruction involves different countries. Additional issues arise with language and culture as educators venture into cultures that are different from their own.

Technical

The need for providing appropriate and working technology cannot be over emphasized. Willis (1993), defines distance education as education that takes place when the teacher and students are physically separated, and technology (i.e., voice, video, data, or print) is used to bridge the instructional gap. The technical media becomes the interface between the instructor and the learners. When this link breaks down all time put into preparing the instruction would have been wasted. Equipment and software compatibilities or the lack thereof can be a major source of frustration for students taking courses at a distance and for instructors as well. Educators should be sure they know the different kinds of technology available in the country before the designing programs to be delivered there. Ensure that the equipment is compatible and software (in the case of computers) are compatible with that of the originating site. Students should have access to the equipment and also possess the skills to use them. Access should be reasonable, students should be able to access the equipment during the scheduled instructional period, and also for class preparation and homework. It is not enough to have a computer lab if students cannot access the computers when they need to or if they have to travel long distances to access them. Equipment incompatibilities can apply to almost all technologies so be sure to check even if your are developing programs that use the simpler technologies. Video cassettes, for instance, seem to be a relatively simple technology but they have to be compatible with the systems used in the different countries. Technology selected should be as simple as possible and should be tested several times before the day of instruction. Recognize that countries are at different stages in technological development and more technology is not necessarily better.

In deciding what media to choose educators should ask themselves the following questions:

- Which media are suitable to me and the learners?
- Do any of our learning objectives imply particular types of stimuli and particular media?
- If so to what extent (e.g. what proportion of the learners time) would I wish to use each of the learner's time?
- What would it cost me and the learner (in money, time, and flexibility) to use these preferred media?
- Would less expensive media be acceptably effective?
- Do the chosen media offer the learner sufficient variety of stimulus and activity?
- How can I combine media for maximum effect (e.g. audio-tape plus real specimens)?

Training

The technologies used for delivering instruction to distant students should be transparent i.e. students should be familiar and comfortable with, and also competent in their use. Preoccupation with the technology can hinder the student's ability to receive instruction. Choose technologies that the students have skills in using or can learn how to use. Devote some time to train students in the use of the technology may seem like a waste of precious class time but the payoff is worthwhile. Games and warming up exercises can be used at the beginning of the program to ensure to get students more comfortable with the technology.

Financial

Financial issues are closely linked to the cost of technology. Differences in financial resources and cost structures can greatly impact the viability of a course delivered abroad, especially to developing countries which may not be as financially endowed as the their counterparts in a developed countries. Institutions may not be capable of investing a lot of financial resources into courses that it may otherwise benefit from. Students may not be able to afford the fees required for them to participate in such courses. Instructors should consider the issue of financing in developing programs to be delivered internationally.

Pedagogical

As happened in the case of the students in the course described, teaching a combination of face-to-face students and distant students can be frustrating for both the students at the originating site and the distant students but most often the distant students feel neglected. One student said "I felt that in some discussions we were left to the side because he (the instructor) was too busy answering and calling on people that were right next to him". Instructors should make an effort to recognize the distant students and include them in class discussions. Instructors should be aware of time lapses that may occur with technologies, for example interactive video, and give students enough time to hear questions and themselves enough time to hear the students' responses. A study of interactions in an international audioconferencing course showed found differences in the frequencies and duration of responses by students in the originating site and the international sites (Bunker, Nti, Reidell, and 1996: Nti & Bunker 1996). The international sites participated more when the instructor directed questions to specific sites than when he left them open..

Cultural and Linguistic

With pedagogical issues also come issues regarding cultural and linguistic differences. Cultural issues present perhaps the most difficult challenge to educators and tend to be the most often ignored (Conner, 1995). Differences in cultural perspectives of the instructor and learners, according to Moore (1994) will have more long term effects on the success of programs than other issues and they also involve the personal, institutional, and national values of educational providers. In the case study presented, cultural and linguistic issues did not present any problems. While differences may exist in institutional and even social cultures within a country, these differences become sharpened when dealing with different countries. Agricultural educators must recognize the cultural context within which they plan to deliver programs and incorporate it into the instructional design. Language differences should be recognized both in terms of words and symbols as well as the its deeper meaning. Students whose first language is not the one being used for the instruction might need more time to translate questions and instructions into their own language and back to the language of instruction

Educational Importance

This study provides an empirical basis for discussing the opportunities that international agricultural and extension educators can gain from linking their classrooms and extension programs with learners at different sites and what they need to do in order to deliver effective programs in this manner. In order for international agricultural educators to gain full benefit of communications technology they have to ensure that the technology is accessible, is compatible at all sites, and that learners are adequately trained to use it. In addition, they have to adopt strategies that ensure that the instruction is appropriate and beneficial to all sites and that learners from all sites are included in class discussions. Educators should consider factors like different socio-cultural, institutional, and availability of financial, technical, and human resources in developing and delivering educational programs to learners at different sites, especially in international situations.

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Session F **Communications Technologies**

Session Chair - Layle Lawrence
Lincoln Room

TITLE: Communications Technology and Agricultural Extension in Pakistan

AUTHOR: Latif Lighari, University of Connecticut
DISCUSSANT: Rakey Cole

TITLE: Communication Channels Preferred by Rural and Urban Audiences for Conservation Information about La Primavera Forest, Mexico: Implications for Extension Services

AUTHORS: Ana Ramirez Carr, Eric Abbott
Iowa State University
DISCUSSANT: Rakey Cole

TITLE: Communication Technologies for International Agricultural and Extension Education: Challenges and Opportunities

AUTHORS: K. Dale Layfield, Naana O. Nti, Rama B. Radhakrishna, The Pennsylvania State University
DISCUSSANT: Arnold Parapi

TITLE: Extension Communication and Sustainable Agricultural Training Needs of the Innovative Farmers of Ohio

AUTHORS: Robert A. Agunga, Ana Lucia Kazan
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COMMUNICATIONS TECHNOLOGY AND AGRICULTURAL EXTENSION IN PAKISTAN

by

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Communications Technology and Agricultural Extension in Pakistan

Introduction:

> Most studies indicate that the variables that consistently explain farmer inefficiency are farmer's knowledge and skills. As emphasis switches from input intensification to input efficiency, improvements in information and skills play a bigger role in increasing productivity. The information burden on farmers will only increase as agriculture becomes more commercialized and sustainability issues come to the fore. Extension thus plays a central role in improving productivity growth, and also in making the distribution of knowledge more equitable. Small farmers may find it more expensive to acquire knowledge, and so public extension has a role in equalizing access to new methods. (Faruqee and Carey, 1995).

Many exciting Extension education programs are being developed and delivered through modern communications technology in the U.S.A. International implementations of this technology have occurred in a number of countries, mostly on the lines of developed, developing and underdeveloped stages of those countries. The adoption of communications technology requires an understanding and identification of such a need, defining the goals and objectives, commitment to the goals defined, and finally to commit the resources to implement such goals. This process involves many partners, ho are interested in a common goal for various reasons. A large number of collaborators and cooperators work together to achieve this goal. The communications technology as defined for the purpose of this research includes: educational methods/programs that use computers, satellite programming, distance education, television, radio and other modern technology in Pakistan, by the Agricultural Extension System.

In the U.S.A., colleges and universities have traditionally facilitated this process of adoption. University personnel at these institutions are aware of the state-of-the-art technology and instructional materials. Private businesses and industry cater to the needs of the community and the institutions. The linkages between the industry, colleges and universities, the Cooperative Extension System, the continuing education organizations and local schools develop to meet the needs and goals of all collaborators. In-service programs develop to meet the current needs while adopting the newest technology. The infrastructure and institutional collaboration with industry for such purposes in Pakistan are limited.

Situation:

The economic growth of an economy is measured by using the weighted averages of the growth in its major sectors. Agriculture is the second-largest sector of Pakistan's economy and counts for 23 percent of the GDP (Gross Domestic Product) (Malik, Aftab and Sultana, 1994). Agriculture is the foundation of Pakistan's economy. One-quarter of its national income is derived from the agricultural sector. A considerable portion of the country's manufacturing industry is dependent on sales of farm inputs and consumer goods to the agricultural sector just as it is dependent on the purchases of agricultural commodities produced by the agricultural sector. More than one-half of Pakistan's labor force is engaged in agriculture. Nearly three-quarters of the exports of the nation are agriculturally related goods. Similarly, about three-quarters of the population lives in rural areas. The well-being of this population depends, directly and indirectly, on what takes place in the agricultural sector. (Malik, 1988). Since the early focus on public sector extension in the 1960s, opportunities for small farmers to acquire technical information from sources other than the public sector have expanded rapidly. Improved transport networks have been one factor facilitating the expansion of NGOs and of the private commercial sector into remote areas. But, the change has been most rapid with telecommunications: radio - and, in some countries, television - is now widely available in rural areas. Higher literacy levels and improvements in printing technology have expanded the opportunities for the spread of technical information through printed materials.(Overseas Development Institute, 1994).

Some Facts about Pakistan and its Agricultural Extension:

Geography: Location: Southern Asia, bordering with India on the east, with the Arabian Sea on south, with Iran and Afghanistan on the west, with Russia on the North and with China on north-east. Area: Total area: 803,940 sq. km., Land area: 778,720 sq. km., Irrigated Land: 170,000 sq. km (1992). Arable land: 23%, meadows and pastures: 6%, forests and woodland: 4%. Major crops: cotton, wheat, rice, sugarcane, fruits and vegetables. Livestock products: milk, beef, mutton and eggs.

Population: 131,541,920 (July 1995 est). Literacy: age 15 and over, who can read and write (1990 est): Total population = 35%, male = 47%, female = 21%. Labor force: 36 million (agriculture = 46%).

Communications: Television Stations = 29. Radio Broadcast Stations = AM 19, FM 8, Shortwave 0. Telephone System = about 7 telephones/1000 persons.

Administrative Divisions and the structure of Agricultural Extension System in Pakistan:

Four provinces (Punjab, Sindh, Balochistan and North-West Frontier), Federally administered Tribal Areas, the Pakistani -administered portion of the disputed Jammu and Kashmir region, which includes Azad Kashmir and the Northern Areas. Each of the four provinces of Pakistan have the departments of Agriculture, which administer the Agricultural Extension System in each province, headed by the Director General of Agricultural Extension, who reports to the provincial Secretary of Agriculture. Each province is divided into ten-to-fifteen Districts. The District Extension office is headed by a one or more Deputy Directors of Agriculture Extension. Each District in the country is divided into sub-districts, called Taluka(s). Each Taluka has a Taluka Extension office, headed by an Agricultural Extension Officer (in some cases called Agriculture Assistants). Each Taluka is sub-divided into a net-work of field offices, housed by one or more Field Assistants. The net work of field Extension Centers is extensive and distributed in all parts of the country - rural as well as urban.

According to Faruqee and Carey (1995), Extension programs are a significant item in the current agricultural budget, but their impact is negligible. An elaborate extension system is already in place for crops, but many farmers question its usefulness. Organizational problems are severe (especially lack of accountability), and operational funding for extension workers is low. There are now over 5,000 village extension workers, but they often lack adequate training, which makes their task of improving the management skills of farmers very difficult. Extension workers with higher education and communication skills are likely to be assigned administrative responsibilities. The system is characterized by a one-way transfer of technology to a few inadequately selected farmers. Feedback from farmers is poor. In contrast to the system for crops, livestock, forestry and fisheries are neglected. (Note: Most provinces have a separate department(s) of forestry and fisheries).

Purpose of the Research:

The purpose of this research was to ascertain the extent to which Agricultural Extension in Pakistan is integrating communications technology in its educational activities and programs by identifying the degree of involvement and type of technology activities and programs currently being used. The planners, Extension educators, Extension administrators, state governments, federal ministries and others may use this research base from which to design and adopt more effective communications technology tools for the Agricultural Extension System in Pakistan.

Methodology:

A questionnaire was developed, pilot tested and mailed to all Agricultural Extension department heads of four provinces of Pakistan, all colleges and universities of agriculture and randomly selected staff of the district agricultural Extension field offices of the four provinces of Pakistan. It was a simple "yes" or "no" and "fill in the blank" (short answer) type questionnaire. The responses were tabulated and conclusions were drawn based on the answers provided.

Results and/or Conclusions:

As a result of this research, it was found that the level of communications technology as defined in this paper, used in agricultural Extension programs and organizational function in all four provinces of Pakistan was very limited. Communications via computers, satellite programming and distance education was non-existent at this time. Technology used to communicate with farmers by agricultural Extension personnel was in one or more of the following modes:

1. Telephone.
2. Extension's educational radio programs directed at local farmers and their needs.
3. Extension's educational television programs directed at the local farmers and their needs.

According to Overseas Development Institute(1994), over the last two decades local radio has become a widely used medium for the dissemination of technical information, and allows specific ethnic groups to be approached in their own language and in ways compatible with cultural norms.

The availability of computers in the departments of Agricultural Extension in all four provinces of Pakistan was limited to the state-level (provincial) management/administrators. The use of computers was also found in state agricultural colleges and universities, teaching Extension education and agricultural extension. Some faculty members had a limited access to the modern communications technology modes, such as e-mail and internet.

After analyses of the data collected it was concluded that:

(a) A limited use of communications technology exists in the Agricultural Extension system of Pakistan.

(b) Further research is needed to explore the reasons for such a low level of adoption of communications technology by Agricultural Extension in Pakistan.

(c) Further research is also needed to explore a possible relationship in trends of adopting modern communications technology between third world countries and the so called developed countries.

Educational Importance:

This paper will provide a research base for scholars and educators involved in the development of the Agricultural Extension system and its level of adoption of communications technology in Pakistan. According to Faruqee and Carey (1995), since no one is happy with the performance of the extension service, major reform is a top priority. The notion of extension as a top-down, supply-driven process needs to be revised. The goal should instead be to create a demand for information among farmers, a demand which could then be satisfied by extension workers. The service should concentrate more on participatory problem-solving with farmers at the local level, which means substantially improving the education level of farmers and extension workers. The extension service will have to be reduced in size. Instead of too many extension agents with too little training, there should be fewer, better-qualified agents.

The colleges and universities preparing the future work force of Agricultural Extension in Pakistan may explore the need for such technology and communications tools. Human resources development teams of the Agricultural Extension, planners and managers may use this information for further training and exploration.

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Communication Channels Preferred by Rural and Urban Audiences for Conservation Information about La Primavera Forest, Mexico: Implications for Extension Services.

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Introduction

During the past two decades, and especially since the U.N. Conference on Environment and Development in Rio in 1992, there has been considerable interest in moving beyond assessments of the state of physical damage to the environment. It has been recognized that two keys to dealing with natural resources conservation are: (1) to understand the human factors associated with environmental damage and its prevention (Stamm, 1972); and (2) to explore the role extension can play in educating people and changing their environmental behavior (Kangas and Rivera, 1991). While a considerable amount of research into audience understanding of environmental issues and the communication channels used to reach people has taken place in the United States and Europe (see Grunig, 1977, 1983; Cantrill, 1993), a full understanding of natural resources conservation knowledge, attitudes, and information sources in the developing world has just begun (see Development Communication Digest, section on the state of environmental communication, 1993).

It is estimated that about 200 million people in the Third World are on a regular or repeated basis undergoing social consequences of protected areas in either traditional or modern societies, in or near protected areas (Rao and Geisler, 1990). Because many of the most critical environmental impacts are occurring in developing countries, a better understanding of how people in these countries understand environmental issues and how they learn about them is urgently needed.

This study examines environmental media use patterns, problem perceptions, and direct environmental experience of three groups of people living in and around the city of Guadalajara, Mexico. The environmental focus of the study was on a protected forest reserve area *La Primavera* located near the city. The first group of people was residents of the city itself, the second were individuals who were interviewed while visiting the forest reserve area, and the third consisted of persons who live in or near the forest reserve. The study was conducted in cooperation with the University of Guadalajara. Concern about ways to protect the forested area has increased as the city of Guadalajara -- now with a population approaching five million -- grows up and around the protected area.

Access to and use of mass media for natural resources education

The pattern in the past 30 years in Mexico and other developing countries has shown a rapid increase in access to electronic media such as radio, television and even videocassette recorders. While statistics in the 1960s showed that radio was emerging as an important communication medium, television was confined to only a few urban areas (Schramm, 1964). Although precise data on ownership and access to mass media are often difficult to obtain, isolated studies have shown a dramatic increase in access. Even in rural areas, reported access to information from print and radio programs has increased dramatically (Hornik 1988). By 1983, Abbott and Martinez (1984) found that almost 70 percent of rural audiences in the Dominican Republic were listening to radio for information, and another 25 percent had a television set. Abbott (1981) found that although only 17 percent of residents in a rural Costa Rican region had electricity, almost a third had a television (operated by car batteries) and radio was almost universal. Current estimates are that in Mexico today almost half of the households have a television set (Hanson and Narula, 1990), and radio is almost universal. Estimates of ownership of television sets in other Latin American countries range as high as 90 percent (Venezuela), and hours of viewing also are becoming similar to that of the United States (Barrios, 1988). Because of the increased availability of mass media, it is important to assess how these media are perceived as a source of environmental information by audiences in developing countries, and to compare patterns of use in developing countries with those of the United States and Europe.

In the developing countries, environmental communication campaigns in Bolivia (1985-86), the Dominican Republic (1983-87), Nepal (1978) and Guatemala (1978) (For these countries reports see Development Communication Digest, 1993) showed that radio could be used effectively not only to attract attention but to provide basic environmental information. Television was used in environmental education projects in Thailand (1986-87) and Honduras (1980-82) (Development Communication Digest country reports, 1993), the India SITE Project (Shingi and Mody, 1976), and India (1987) (Ettenger, 1989).

Stamm (1972), Grunig (1977, 1983) and others have pointed out that mass media information alone does not lead to environmental understanding or action. A combination of situational and perceptual factors are also involved. Those who already believe that the environment is an important problem will be most likely to attend meetings and pay attention to media messages. Those who believe that they can do something about the problem are most likely to act. Those who have personally experienced an environmental problem are more likely to learn more about it and participate in organizations dealing with it. In Guadalajara, a 1995 study showed that 45 p
Primavera forest at least once in the past year (Carr, 1995). A survey of 400 Guadalajara families in 1984 found that 77 percent said they "frequently" visit the area.

Lowe and Pinhey (1982) also found rural and urban differences in perceptions about environmental problems. They found that those in the agricultural sector are least likely to be environmentally concerned. Demographic variables have had some predictive relationship to environmental concern and media use in United States studies. Cantrill's 1993 review of literature concluded that age is often negatively correlated with environmental concern, and higher education is associated with greater environmental awareness. He also reported little

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relation between income levels and concern for the planet, and no differences in concern between men and women (Cantrill, 1993).

From the literature, a number of questions arise for the current study:

1. What is the most important source of information about the environment and technical issues in a protected area in developing countries such as Mexico today? How are various media sources rated as conservation information sources?
2. What do respondents believe are the most important problems they face today? To what extent are conservation issues seen as one of these important problems? What factors seem to be associated with viewing the environment as the most important problem?
3. How different are the media behaviors and environmental perceptions of the three different groups of persons interviewed: those who live in the city of Guadalajara itself, those who reside in or near the protected forest, and those who are visitors to the forest? Are those who live in or near the forest (many of whom are farmers) less inclined to mention the environment as a serious problem?
4. For those who live in the city, is personal experience with the protected forest as a result of having visited it associated with increased environmental concern?
5. Is there any evidence that environmental educational materials that have appeared in the mass media in Guadalajara have been successful?

Survey methodology

Prior to launching the survey, a series of focus groups was utilized to explore views of residents toward the environment and La Primavera Forest. Based upon the results of the focus groups, three slightly different versions of the same questionnaire were developed, one for residents of the city of Guadalajara, one for residents of the La Primavera area, and one for visitors to the La Primavera forest area. Surveys were conducted in person in January and February 1995, by 27 trained undergraduate students from the University of Guadalajara. Although different selection methods were necessary for each of the three areas, in all cases a stratified random sampling technique was used in order to ensure representativeness of gender, age and education. The total number of individuals interviewed was 496 in the city of Guadalajara, 49 for those living in the forest area, and 25 visitors to the forest area.

Findings

1. Use of information sources

Respondents were asked a number of questions about their information seeking behavior. The first question asked them to indicate "by which means they get information" about their area where they were interviewed. Results (Table 1) show that television was named more frequently than any other source, with radio a close second. Newspapers were third, and interpersonal channels were fourth. These results are strikingly similar to many media use studies in the United States, but they are very different from most previous developing country results. Television has clearly arrived as an important information source.

Table 1. By which means do you get the most information about your geographic area? (First Choice Only N=570)

Source	N	Percent
Newspapers	94	16.5
Television	237	41.6
Radio	213	37.4
Interpersonal	26	4.6
Total:	**570**	**100.00**

In addition to asking about the preferred source of information, each respondent was also asked if he or she used various media for information purposes. Results are shown in Table 2.

Table 2 Reported media behaviors

Report buying a newspaper	44.3%	
Report reading a newspaper	60.4	
Report viewing TV	87.2	2.34 hours/day viewing
Report listening to radio	82.4	3.63 hours/day listening

Another question asked respondents "Whenever you have a question about the environment, where do you go?" Results in Table 3 show that the most frequent response was "I don't do anything," (42.1%) and an additional 3.7 percent of respondents said they didn't know where to get information about the environment. Interpersonal sources were the most frequently mentioned category of those naming a source with 21.2 percent, and print media ranked second with 14.6 percent. Television (5.4%) and radio (1.8%) were infrequently mentioned. These results suggest that while general media use relies heavily on television, specific information seeking questions concerning one's environment still rely heavily on print or interpersonal sources. This may be because broadcast media do not carry much content concerning the environment at present. In order to pursue this possibility, respondents were next asked to indicate "by which media would you like to get information about the environment/conservation information?" Responses, in Table 4, show that when asked to select a preferred medium to receive information, television (36%) and radio (31.3%) lead other mass media choices. Interpersonal choices were ranked low here (0.2%), probably because respondents interpreted the question as asking for a "media" preference. Results suggest that respondents might be interested in receiving much more environmental information from broadcast media sources. However, one must be careful in comparing answers for sources actually used for information from sources people think they might like to use more. U.S. information studies, for example, often show people identify television as their primary information source, but when asked where they learned a particular piece of information, they often specify print media (Bogart, 1989; Robinson and Levy, 1986)

There were some differences across demographic categories. Women name television as their first information source (46.7%) more frequently than men (37.3%), and women also name newspapers significantly less than men. This can be linked both to the fact that women often spend more time at home where TV is available and a general trend toward lower readership of newspapers and lower levels of literacy for women (Bogart, 1989). Results are shown in Table 5.

Table 3. When respondents want conservation information, where do they go?

Source	N	Percent
Don't do anything	240	42.1
Don't know where to go	21	3.7
Interpersonal source	121	21.2
Institutional source	41	7.2
"mass media"	23	4.0
Print media	83	14.6
Television	31	5.4
Radio	10	1.8
Total	**570**	**100%**

Table 4. From which medium would you like to receive conservation information?

Source	N	Percent
No answer/no preference	79	13.9
Any mass medium	8	1.4
Print media	85	14.9
Television	205	36.0
Radio	178	31.3
Interpersonal source	1	.2
Total	**570**	**100%**

Table 5 Respondent's gender by first information sources named N= 570

Gender	Newspaper	TV	Radio	Interpersonal	Total
Male	20.8%	37.3%	37.9%	4.0%	54.0%
Female	11.3	46.7	36.9	5.1	46.0
$X^2 = 11.7$ p=.008					

2. Problem perceptions of respondents

Each respondent was asked to indicate in general what problem in their area they regard as most urgent. This was an open-ended item that was asked early in the interview process before the environmental questions. Results were collapsed into four categories: government and economy, crime and violence, public services, and the environment (Table 6). Results show that the aspects of the environment and conservation were often mentioned as urgent problems (53.2%), but the specific aspect differed by geographic area. Those in the city were more likely to mention garbage and air pollution, while those in the forest were more concerned about deforestation. The issue of whether or not forest residents were more likely to perceive environmental problems is specifically examined later in the paper (Section 3).

Table 6 Collapsed table: the most urgent problems

Problem	N	Percent
Government / Economy	60	10.5%
Crime & violence	140	24.7
Public services	35	6.3
Environment	302	53.2

3. Comparisons among the three groups: city residents, forest residents, visitors

Forest residents are individuals who live near or in the La Primavera Protected Forest zone. Many of them are farmers. Results show that forest residents tend to be slightly older (mean age 35.9 as opposed to 33.7 for visitors and 31 for city residents) and less educated than their city counterparts, although no differences were found for socioeconomic status. Forest residents were more likely to name a conservation problem as "urgent" than were city residents. Perhaps this is due to the fact that forest residents lack some of the crime and violence problems mentioned by their city counterparts, and to their direct contact to the forest. Virtually all mentions of crime (28.4%) and government/economy (12.7%) concerns were made by city residents. At a minimum, one can conclude that forest residents and visitors are very concerned about the environment, and therefore would be expected to be receptive to information about its protection.

Table 7 City, forest, or visitor group by most urgent problems

Group	n	Govt/ Economy	Crime	Pub.Serv.	Environm.
Forest residents	49	2.9%	2.9%	0	94.3%
Forest visitors	25	0	11.1	0	88.9
City residents	496	12.7	28.4	8.7	50.2

$X^2=25$ $p=.0001$ on collapsed version with visitors removed.

Residents of the forest area were also compared to city residents and visitors for their general sources of information, where they go to get environmental information, and their preferred media sources. Interestingly, forest residents were significantly more likely to name newspapers and interpersonal contacts as general information sources. However, when asked where they go for environmental information, they responded with fewer (although not significantly fewer) mass media mentions than city residents (interpersonal contacts were still higher). There was no difference among the three groups in media they would prefer to use for environmental information.

The city, forest, and visitor groups also were compared concerning whether or not they believed that conditions in their area had changed for better or for worse in the last few years. The forest resident group was significantly more likely to say that the changes have been for the better (71.4%). The most frequent response in city and visitor groups was positive, but more than one quarter of each group believes that conditions have worsened (28% each). These results are shown in Table 8. These results could possibly indicate a reality -- that things have gotten worse in the city in the past few years while improving in the forest area. There have been efforts to further protect the forest during that time. Even though forest residents think things are improving, the majority still rank the environment as the most urgent problem (94.3%).

Table 8 City, forest or visitors group by perception that conditions have changed for the better or worse during the last few years

Group	Change for the Worse	Change for the Better	No answer
Forest resident	10.2%	71.4%	18.4%
Visitor	28.0	36.0	36.0
City resident	28.4	43.7	27.0
X^2= 16.7 p=.01			

4. Does personal experience change environmental problem perceptions?

All those living in the forest or visiting it have had personal experience with the La Primavera forest that might have an impact on their perceptions of urgent problems. However, more than half of those in the city have had personal experience with the forest during the last five years (66.65%) and 46.55% during the previous year. For this reason, the city data subset was separated in order to examine the impact that personal experience with the forest might have on the perception of the most urgent problems.

As shown in Table 9, there was a small but significant tendency for city residents who have personally visited the forest to be more likely to identify the environment as their most urgent problem (50.7%) than those that did not have personal experience (45.4%). However, frequency of visiting the forest did not seem to make any difference. These results offer some support for literature suggesting that personal involvement is important in environmental perceptions. However, as attitudinal studies have noted (Azjen, 1980; Fishbein, 1967), much more specific questions would need to be included in order to test the notion of a specific experience's relationship with perceptions of environmental problems in that area.

Table 9 Personal experience with La Primavera forest by perception that the environment is the most urgent problem: city residents only

	Gover./Econ.	Crime	Public Serv.	Environment
No personal experience	20.2%	27.7%	6.7%	45.4%
Personal experience	10.4%	29.3%	9.6%	50.7%
X^2 =7.98 p=.046				

5. *Evidence that environmental education efforts in the mass media have been successful*

For a number of years, the University of Guadalajara has inserted environmental information into a local newspaper, and environmental messages have also appeared on radio and television. In addition, some school classes contain environmental messages although they are not part of the formal curriculum. One of the themes that has run through these messages is the idea that the La Primavera forest is the "lung" for the city of Guadalajara, and that the forest is essential to the quality of air of the region. Respondents were asked to respond to an open-ended question: "What does La Primavera forest mean to you?"

Responses were coded into categories. Any response that mentioned the "lungs" for the city was placed in one category. Results for all responses are shown in Table 10. A total of 30.1 percent of respondents mentioned the "lungs," indicating widespread knowledge of this environmental symbol. This suggests that over time, environmental messages have been internalized by audiences in the area.

Table 10 Responses to question, "What does *La Primavera* forest mean to you?"

Response	Percent %
No answer	14.9
"Lungs" for the city	30.1
Contact with nature	2.3
Peace, tranquility	8.9
Recreation	18.4
Ecological reservation	5.4
Forest, trees	4.0
Beautiful	4.9
Health	0.5
Vital, important	1.4
State legacy	1.4
It was a forest; ugly now	0.7
Important thing	6.1
Something to do; accessible	0.2
"Nothing"	0.4

Conclusions

All these data can be summarized as having particular implications for educational program design:

a) Farmers and city residents do learn about conservation information issues from the media. When asked what the La Primavera forest meant to them, more than 30 percent of respondents answered an open-ended question with a response that included a major campaign symbol (that the forest is the "lung" for the people of Guadalajara.)

b) The use of television for educational purposes is considered expensive because of its high initial cost to produce. However, results suggest that television must be used because it now reaches many important audience members who used to use radio. The results of this survey of three distinct groups of residents of Guadalajara, Mexico, area clearly show that television has arrived as a major mass media source. Fifty percent of the population has a TV set in their homes, and 87 percent report regular use of television as an information source. In addition, results showed that while interpersonal sources and newspapers continue to be very important sources for specific environmental information, audiences rate television and radio highest in terms of their "adequacy" or desirability for future environmental communication.

c) Focus groups interviews show farmers are already sensitized about conservation issues and are eager to hear about alternative sustainable means of use of the forest.

d) Knowing local farmers' characteristics it is feasible to tailor communication messages for specific audiences. Those living in the forested area itself are less educated, yet regard newspapers highly as a source of information. The great majority believe that things are getting better. However, the great majority also name conservation issues as urgent problems for them. Those in the city identify a number of different problems as urgent -- crime, garbage, as well as pollution. Media messages could be tailored to the specific media and problems they perceive. Because more of them believe the situation is getting worse than their forest counterparts, they might be expected to be more receptive to environmental messages.

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Communication Technologies for International Agricultural and Extension Education: Challenges and Opportunities

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Communication Technologies for International Agricultural and Extension Education: Challenges and Opportunities

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Introduction

We live in a changing world. The development and use of communication technologies currently taking place are certain to bring about changes in education. With the rapid advancements in communication technologies, a great deal of interest has developed about distance education and its uses by colleges and universities. Furthermore, instant worldwide communication has brought a rapidly changing knowledge base. New electronic delivery methods are altering the way Cooperative Extension and outreach systems are operating nationwide (Spanier, 1996 and US Office of Technology Assessment, 1989). Additionally, professional organizations such as AIAEE are planning for the use of modern communication technologies to meet the diverse need of its membership. Steele (1996) envisioned that " by 2005, The Journal of International Agricultural and Extension Education (JIAEE) will become .... an electronically driven publication accessible on the web, via the association's or the journal's home page, to enable interaction with and among readers" (page, 3).

Many technologies are available and used in education. Video-based technology is currently the primary method of instructional delivery. Documents, pictures, videos, sound, and multimedia presentations can be accessed through computer networks such as WWW (Hill, 1993). Salvador (1994) described "pen computing" where an electric pen is used with an LCD screen pad, is being used in a middle school to connect students to an instructor and to one another. The virtual online university, as reported by Marklien (1995), will connect faculty and students from universities around the world.

Moore (1993) encouraged educators to look beyond the challenges and consider the vast opportunities distance education technologies and methodologies facilitate. The opportunities for international agricultural and extension education are numerous. Agricultural and extension educators with international interests will be able to deliver programs to broader audiences, including learners of all ages and from diverse backgrounds. Potential exists for partnerships and collaborative efforts with agricultural extension services not only within the U.S., but also with other countries of the world. In addition, international agricultural and extension educators can collaborate with donor agencies, NGOs, and other organizations engaged in international agricultural development. However, it is important to recognize that in order to make this potential into a reality, we need to explore and understand communication technologies, determine the specific benefits it offers to the profession, and the obstacles it presents.

In their study of obstacles and opportunities for distance education in agricultural education, Murphy and Terry (1995) found that agricultural educators are knowledgeable and hold strong opinions about distance education and related technologies. However, they found that there were several obstacles that inhibited the process of adopting these technologies. These included: 1) lack of time, 2) lack of a formalized reward system for faculty, 3) lack of technical support, and 4) lack of proper design facilities. They suggested that adjustment of faculty assignments and modification of faculty reward systems would help encourage faculty to adopt distance education technologies and methodologies.

In a related study, Murphy and Terry (1995) also found that agricultural education faculty were most negative about their ability to produce instructional materials and use appropriate teaching methodologies for distance education. In their study, 45% of the faculty surveyed were not familiar with teaching methodologies used in teaching courses over distance, while only 20% said that they could confidently deliver a course over distance. Murphy and Terry concluded that the teaching faculty in the colleges of agriculture 1) lack competence in the use of electronic technology used in distance education, 2) lack confidence in their ability to use appropriate teaching methodologies to deliver courses over distance, and 3) have limited access to training and assistance regarding electronic teaching and communications. They recommended that programs to help teachers to become proficient in the use of electronic teaching technologies should be developed. Such programs developed should focus on availability of equipment, types of equipment and their uses.

Purpose and Objectives

The purpose of this paper is to develop a framework for understanding and using communication technologies in a global context. Objectives of the study were to: 1) identify opportunities and resources available for using communication technologies in a global context; and 2) examine challenges that international agricultural and extension educators face in using communication technologies in a global context.

Building The Framework

Literature relative to use of communication technologies was reviewed by the authors to build a framework for understanding and using communication technologies in a global context. The number of communications technologies available were identified and their uses in a global context were also examined. Then, using literature and experiences of the authors, challenges and opportunities for using technologies are discussed and implications suggested for international agricultural and extension education.

There are five major technologies used to facilitate learning at a distance. These technologies include: 1) video/audio cassette; 2) satellite; 3) audio-conferencing; 4) interactive video; and 5) computer-mediated communication. Each of these technologies are unique and have pros and cons that must be considered when deciding appropriateness.

1) Video/audio cassette-These media are used to facilitate learning that is often "independent" in format. The use of audio and videocassette in distance education has grown because of playing machine availability; availability has increased over recent years from decreased costs. Another element favoring the use of these technologies is their portability, making them easy for mailing and handling (Moore & Kearsley, 1996).

2) Satellite--This is a popular technology used throughout education and business for various educational/ training needs. Responding to the success of satellite-based learning in the United States, IBM has installed similar systems in Japan, Australia, the United Kingdom, France, and Germany (Moore & Kearsley, 1996). Considering the costs of satellite use, satellite instruction is normally used in large scale distribution.

Satellite communications started in the mid-sixties when a satellite known as "Early Bird" was launched. Satellites are placed 22,300 miles above the earth's equator and at least 180 miles apart. Placed in the same orbit as the earth, satellites maintain the same position (Azarmsa, 1987). The educational arena began using satellites in the mid 1970s. As several universities in the United States experimented with the new technologies, educational programming through satellite gained widespread interest.

Today satellites are used in education across the globe. Most educational efforts using satellite technologies are supported through organized consortiums. Prior to changing to A*DECS (Agricultural Distance Education Consortia), 32 Land Grant institutions formed a consortium known as AG*SAT (Agricultural Satellite Corp) to deliver agricultural programming (Moore & Kearsley, 1996).

Teleconferencing Communications

The use of interactive video, audio-conferencing and computer-mediated communication are all forms of teleconferencing. This term is comprised of using telephone lines in a conference mode. The first report of teleconference use was in 1939. Dr. Winterstein, Director of Special Education in Iowa, used the assistance of AT&T to meet the needs of homebound and hospitalized students. In less than two years, more than 1,000 students were receiving instruction through a teleconference format.

In recent years, the use of phone lines for conferencing has tremendously expanded. The onslaught of video and computer conferencing systems brought revolutionary meaning to the phrase "teleconferencing." The following media are discussed in respect to their place in the timeline of teleconferencing history.

3) Audio-conferencing--As indicated, audio-conferencing is the earliest form of teleconferencing. The standard set-up for this medium uses speakerphones, phone lines, and an audio-bridge; this "bridge" can link several sites in a conference call format. Audio-conferencing is beneficial considering it allows group interaction and is accessible anywhere an active phone line exists.

One of the pioneering institutions in instructional audio-conferencing is the University of Wisconsin. In 1965, the University of Wisconsin initiated the Educational Telephone Network (ETN) with a postgraduate medical program. The statewide ETN system has since grown, and has served up to 38,000 credit and non-credit students in one year (Rao, 1972).

4) Interactive video-- Also known by many as compressed video, interactive video uses phone lines to distribute video and audio signals. This technology is becoming accepted by many institutions, considering it is less expensive than satellite. Interactive video systems are also popular because of the many "multi-media" capabilities it offers. Most interactive video consoles allow integration of such technologies as slides, microscope cameras, videodisc players, video-cassette players, document cameras, computers, and marlite boards (Stammen, 1995).

5) Computer-mediated communication--This dynamic medium allows a variety of educational opportunities through such technologies as electronic mail, LISTSERVs, chat, and the world wide web.

- Electronic mail, also known as e-mail, is defined as messages stored and sent via a computer system. E-mail has become a popular tool in distance education. It allows interactivity between student and instructor in an a-synchronous setting.

- LISTSERVs--A LISTSERV is a "software" program based on a central computer that sends messages to multiple addressees. As implied, a list of names is placed under a group title and incoming messages are sent to all group members.

- Chat-- This medium is also known as Internet Relay Chat (IRC). Chat provides an active discussion between a group of people using an active computerized internet program. This program allows simultaneous interaction between students and instructors.

- World Wide Web-- The World Wide Web students the opportunity to learn in a graphical-rich multimedia environment. Students use "hyperlinks" to advance through formal courseware and external resources.

The review of electronic technologies offers both opportunities and challenges for international agricultural and extension educators. Some of the opportunities and challenges relative to the technologies reviewed above are briefly discussed in the following paragraphs.

Opportunities and Challenges

Audio/Video Cassette

Cassette tapes have been used as a successful delivery medium for years. Bates (1990) notes that audio-cassette tapes are valuable for some of the following aspects:

- talking students through printed material
- talking about real objects that may need to be observed
- talking students through practical procedures (allows hands to be free)
- providing views of resource persons in an s-synchronous environment

Audio and video cassettes are also valuable when accompanying other forms of distance education technologies. Allowing integration of busy resource persons in satellite programming has maintained the popularity of this recorded media.

Satellite

Distance education through satellite technology has been successful in covering large territories with multiple learners. Wide-spread distribution of satellite transmissions allow more cost-effective programming.

One of the most promising elements in educational satellite is the release of Direct Broadcast Satellite (DBS) systems. DBS systems are proprietary digital satellite television delivery systems which currently offer a variety of programming most of which is similar to that offered by cable television systems. Due to the affordability and quality of DBS systems, the population base receiving satellite broadcasts is expected to rise substantially (A Few DBS Basics, 1996).

Audio-Conferencing

Audio-conferencing is the most inexpensive teleconferencing tool available. Research has shown two-way audio to be an effective educational medium, permitting feedback, discussion, resource sharing, and the sharing of instructors. The audio-conferencing technique is most effective when delivered in 20 to 25 minute lectures and augmented by printed materials, audiovisual aids, and home visits (Parker, 1975).

In a synthesis of audio-conferencing literature, Fowler and Wackerbarth (1980) noted the following opportunities when comparing the media to face-to-face instruction:

-simple problem solving is possible
-brainstorming is possible
-more opinion change occurs in conflict situations
-participants feel more attentive to what is said
-can be used effectively in interviews
-information seeking and discussion of ideas can be effective

Moore (1995) termed the audio-conferencing medium as "robust," applauding the dependability of phone lines and related equipment. Moore has taught many distant courses simultaneously across the globe with audio conferencing systems.

Interactive Video

Interactive video provides relatively inexpensive instruction, considering the audio and visual features. This media uses a "compressed video" concept, allowing students from multiple sites to meet face-to-face with the instructor. Compressed video has been found successful as an instructional tool for graduate courses (Portway & Lane, 1992).

Computer Mediated Communication

The use of e-mail for computer conferencing has gained widespread popularity. One major advantage of e-mail is its availability across various computer platforms. Learners across geographic and cultural boundaries share experiences and knowledge, enriching the educational process. Burge and Roberts (1993) note that computer conferencing offers several strengths:

- convenient for people with fixed schedules
- learners are allowed more time to reflect before answering questions
- costs are minimal
- learners are less threatened to discuss issues, promoting learner equality

A LISTSERV is a software program usually located on an e-mail server that creates discussion groups using electronic distribution lists. The value of LISTSERV is that it enables student-student, student-teacher and possible student-content interaction, supporting fundamental distance education theory (Moore, 1989). Many institutions allow LISTSERV groups to be set-up free of charge.

One use of LISTSERV gaining in popularity is the "ask an expert" concept (Stammen, 1995). Using LISTSERV groups, experts in concentrated areas answer questions that have been electronically posted via e-mail. Using this concept allows students to see questions/answers others have that may be related to their own needs. This idea has been used in various courses complemented with CMC, providing the expert opinions of related resource persons.

Chat allows simultaneous interaction between students and teachers, and class conversations without leaving the work or homesite. Some instructors are using Chat as a means of live class discussions. David Passmore, Professor in Penn State's Workforce Education and Development department, uses Chat as a "coffee room." Students enter the coffee room to visit about subjects pertinent to the course. This activity gives the students that are in a ubiquitous mode, a feeling of unified presence.

The World Wide Web has rapidly grown in popularity over recent years because it allows users to view color graphics and download an array of multimedia. Once access to the internet has been acquired, one can use a web browser to download direct or related course materials. Many web browsers are free to people involved in education.

Although time is required to properly design web pages for effective education, there is normally no cost for faculty to post instruction on university servers. The Web allows multiple-site delivery and promotes accessibility for content experts in any subject. Some of the numerous benefits making the use of World Wide Web browsers dynamic include:

- specialized files and programs pertinent to course instruction can be downloaded through a process called File Transfer Protocol (FTP)
- high quality movies, graphical images, and sound files
- text that is fully formatted
- real-time digitized sound access

All of these technologies offer a plethora of opportunities. The previous discussion attempted to help international agricultural and extension educators recognize the value of these technologies. However, awareness of possible limitations or challenges should be considered when selecting the best delivery method.

Many challenges exist for educators to successfully use the aforementioned technologies. Concerns that may exist include: a) lack of communications technologies hardware; b) lack of communications infrastructure; c) lack of adequate training relative to use of communications technologies; d) technical difficulties; and e) socio-cultural barriers--time, language, and political stability. Here is a brief description of some challenges the inter-national agricultural distant educator may face when using the technologies previously discussed.

Audio/Video Cassette

Some recommendations from noted authors concerning audio-cassette are addressed.

- audio cassette should not be used when students can read from a printed script.
- audio-cassette is valuable when narrative or dramatic instruction is being used
- audio cassette should not be used for lecture (Moore & Kearsley, 1996)

During the training of agricultural agents in T&V systems, many educational aspects may be related through the use of an instructor's voice inflection. If ideas are to be stressed in international agriculture, audio-cassette may benefit the educational purpose. If possible language barriers could occur, the producer of the tape may consider pacing the speed of the presentation to meet the needs of the learner.

Satellite

One of the major problems with satellite in recent years is rising costs. Poley, Haggett & Tschetter (1996) noted a general recurring theme from the Global Summit on Distance Education is the problem of competition for satellite time. The wealthy entertainment industry dominates the majority of satellite airtime. Many speakers at the conference specified the need for cooperative purchase of satellite time in blocks, or encourage government purchase of a satellite for educational purposes.

Audio-Conferencing

Parker (1975) noted some of the most basic challenges in audio-conferencing are "initiating rapport and maintaining attention." The author stressed that overcoming such challenges can be attained through: 1) using a personalized approach; 2) employing varied teaching styles; and 3) evaluating the appropriateness of the mode of instruction.

In a synthesis of audio-conferencing literature, Fowler and Wackerbarth (1980) noted the following challenges when comparing the media to face-to-face instruction:

- people are judged less favorably when they meet by phone
- many consider the audio-conferencing less personal
- in group organization, audio may be less productive, produce more hostility and require more time
- undesirable for complex tasks

Interactive Video

Although interactive video offers audio and video access for students, some of the negative components about the system may question the benefits. Burge and Roberts (1993) noted some of the challenges concerning compressed video:

- motion must be kept to a minimum or blur will occur
- lecturer should not attempt over 10 minutes, lose learner attention quickly
- try not to move camera rapidly, students can become "seasick" with quick movement

In a 1996 study of Turfgrass course participants using Interactive Video, Nti & Layfield (1996) discovered some concerns of this medium. Some of the findings necessary for future planners using this media include:

- some learners had difficulty getting the instructors attention for questions
- some learners felt uncomfortable with time lag that occurs between two Pictel sites -- the learners indicated the feel of blank stares
- students wanted time to get to know learners at the other site; if the instructor is not going to allow for that time, a LISTSERV dedicated for learners discussion should be available
- some learners indicated problems with seating arrangements, often the instructor overlooked them when seated in "blind spots"

After experiences teaching and receiving instruction through this media, the authors offer additional pointers for consideration:

- respect cultural barriers, if learners is uncomfortable with camera, try to find a "negotiable" distance
- if learners are uncomfortable speaking at lengths on camera, have them post their comments using computer conferencing
- many countries do not have the necessary infrastructure to support interactive television, audio connections may be necessary for this audience
- if learners are using audio-conferencing, one should be cognizant of visual implications such as:
  - if visuals will be used in a presentation, send or fax them to the audio sight in advance

- share learners pictures between audio and video sights, allowing learners to place a face with the voice; in recent years, web pages have been created with comparable pictures of the course roster

Computer-Mediated Communications (CMC)

Two noted experts in computer-mediated communications, Burge and Roberts, (1993) identified some additional challenges for CMC:

- keep students on the subject, often it is easy for students to get off of the subject in e-mail
- learner access to appropriate software and equipment is critical
- a technician will need to be available before, during, and after conferences

Nti and Layfield (1996) noted some findings concerning challenges of web instruction. Found in their study of a Turfgrass course delivered via the web and interactive video, the authors identified some challenges of this medium:

- learners had difficulty getting into labs to do their work
- learners disliked having to sit for long periods of time for slow downloading
- learners at one site had a "firewall" security system that slowed downloading drastically; one of the students began printing out the web pages for other learners

Participating in several courses taught or accompanied with CMC has provided the authors with some concerns surrounding the respective media. Some concerns worthy of noting are:

- when English is a second language, all users in the computer conference should be cognizant of language barriers
- when using a LISTSERV, have participants get into the habit of always identifying who they are in a conference
- assign learner to use the computer conference, many are going to feel uncomfortable discussing issues at first, and will be happy lurking, this does not promote active learning

Educational Importance

The framework discussed above suggests that there are several communication technologies that international agricultural and extension educators can use. Such uses of the technologies include conducting extension programs, teaching courses, developing collaborative projects, and exchanging information and ideas relative to international agriculture and extension education. In order to do this, adequate training should be provided to users of the technology. Michael Moore, (1995) recommended using a combination of the media. This combination may provide benefits of flexibility, low cost, pedagogical effectiveness, and robustness. To attain high quality communication technologies, one must invest a substantial amount of time in course design and training, delivery, and costs. If these criterion are met, then communication technologies can be cost effective and efficient.

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EXTENSION COMMUNICATION AND SUSTAINABLE AGRICULTURAL TRAINING NEEDS OF THE INNOVATIVE FARMERS OF OHIO

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Abstract

As more and more farmers become aware of the economic and environmental benefits of sustainable agriculture so grows the popularity of the concept. Beginning in the mid-1980s, sustainable agriculture as an innovation has diffused to virtually all parts of the world. With many more farmers adopting sustainable agriculture, it would seem that Extension workers who, hitherto, were skeptical of the concept, must now promote it. But what communication strategy is necessary for working with sustainable agricultural farmers? Will the traditional top-down or researcher-to-extensionist-to-farmer approach work just as well? This study was conducted among the Innovative Farmers of Ohio, a sustainable agricultural group, to determine their Extension communication and other information needs. The study found that IFO farmers feel that many Extensionists still view sustainable agricultural practices with contempt. It also found that IFO farmers reject the top-down extension communication approach; instead, they want the extensionist but serve primarily as a facilitator.

Introduction

Sustainable agriculture is gaining more ground as farmers become more aware that it not only makes environmental sense but economic sense as well. The term "sustainable agriculture" means many things to people. Terms such as "alternative," "low input sustainable agriculture," "ecological," "regenerative," and "organic" are often used to refer to shades of "sustainable" agriculture (Lockeretz, 1990). However, the general meaning of SA is that of an integrated farming system aimed at minimizing dependence upon synthetic inputs and maximizing the use of biological and cultural inputs. Its primary goal is improving agricultural sustainability, the conservation of natural resources, farm income and the sustainability of rural communities. The Food, Agriculture, Conservation, and Trade Act of 1990 offers a comprehensive definition of SA as:

> [An] integrated systems of plant and animal production practices having site specific application that will over the long run: a) satisfy human food and fiber

> needs, b) enhance environmental quality and the natural resource base upon which the agricultural economy depends, c) make the most efficient use of nonrenewable resources and on-farm resources, and integrate, where appropriate, natural biological cycles and controls, d) sustain the economic viability of life for farmers and society as a whole (see Ikerd et al, 1996, p. 25).

In essence, SA must be environmentally sound, economically viable, and socially responsible. These three factors--economic viability, environmental sustainability and social responsibility--combine to make sustainable agriculture perhaps one of the fastest spreading innovation today. Introduced primarily in the mid-1980s, sustainable agriculture is now practiced in just about every corner of the world. Fridgen (1995) notes that people are expressing a growing interest in conservation, preservation and ecological issues. Recycling programs for paper, glass and plastic are everywhere in the U. S.

Manufacturing industries are also making changes in products and packaging to reduce damage to the ozone layer. Schools are teaching children the need to recycle and to be environmentally friendly (Kirby et al, 1995). Finally, consumers of all ages are watchful of the presence of hazardous ingredients and chemicals in the food supply (Frazao, 1994).

These environmental concerns of consumers are, in turn, affecting the way farming is done in America. Commercial farmers are now more sensitive to the use of chemicals such as fertilizers, pesticides and fungicides, than they were 10 years ago. Researchers have established linkages between farm pesticide usage, pollution and food poisoning or hazardous health consequences. There are three main reasons why environmental concerns are becoming a major part of today's agriculture.

First, commercial agriculture is becoming increasingly expensive due to the necessary high cost of chemicals and machinery. This dependence on capital-intensive inputs has lead to farmers acquiring heavy loans from credit institutions followed by an inability to repay; the result of which has been bankcrupcies and farm foreclosures, particularly in the 1980s (Neher, 1992). For example, although fertilizer is the largest cash expense for corn farmers, representing 32% of the production budget, its rate of efficiency in producing corn declined by 24% in the last 25 years (Ess et al, 1994).

Second, the earth is exhibiting signs of exhaustion after so many years of exploitation, in the forms of soil erosion, pollution of ground and surface waters by agricultural activity, depletion of non-renewable energy sources, and environmental and economic stresses (Smolik et al., 1995). Williams (1996) notes that the high cost of inputs was one reason why some Wisconsin farmers surveyed in 1994 switched to

SA. Lowering production costs was also among the 10 priorities of Midwest farmers (from Indiana, Illinois, Ohio and Iowa) who participated at the 1991 Top Farmers Crop Workshop at Purdue University (Musser et al., 1994).

Table 1

Number of Hectares of Certified Organic and in Conversion Land in the European Union

Country	Yearly Increase in Certified Organic and/or Conservation Land				
	1985	1990	1995	1996	%Tot Ag
Area					
Austria	10,000	22,000	293,877	380,000	10.9
Belgium	500	1,200	3,956	4,000	0.3
Denmark	4,340	11,581	28,000	40,000	1.5
Finland	1,000	11,000	28,000	30,000	1.2
France	45,000	65,000	85,000	85,000	0.3
Germany	29,100	59,734	272,139	310,484	1.8
Greece	n/a	150	3,500	3,500	0.1
Ireland	1,000	3,700	6,457	7,000	0.2
Italy	5,000	11,000	154,000	200,000	1.2
Luxembourg	350	550	500	500	0.4
Netherlands	2,450	7,469	13,000	15,000	0.8
Portugal	200	550	3,000	3,000	0.1
Spain	2,140	3,650	20,300	21,000	0.1
Sweden	4,500	38,890	84,000	101,458	3.3
UK	6,000	20,000	32,476	47,901	0.3
Total EU	111,580	256,974	1,028,233	1,248,843	0.9

Third, and perhaps the most important, farmers are discovering that sustainable agriculture is profitable not only in financial returns to the farmer but cost-saving to the public. The profitability of SA to individual farmers is evident in the growing number of organic farmers in the U. S. and Europe. The 1996 U. S. National Organic Directory lists 800 organic industry businesses, and the Sustainable Agriculture Directory of Expertise has 723 organizations in all 53 states. In Ohio the number of certified organic farmers has increased by almost 200% from 1990 to 1996. The growth of organic farm product markets in Europe and the U. S. led to the establishment of a program for certifying organic growers in these countries. Data from the Welsh Institute of Rural Studies in Great Britain (1996) show a more than 100% increase in certified organic farms throughout Europe over the past 10 years. In

Austria, the increase has been a phenomenal 3,800% jump as shown in Table 1 above.

The benefit of SA to society is less difficult to measure, it is indirect. However, the benefit amounts to billions of dollars in tax savings, a cleaner environment and healthy living for people. For example, the U. S. national bill for sedimentation damage is estimated at between $4 billion and $44 billion, depending on which costs economists and other experts include in the study (Hitzhusen, 1996). But even the more conservative figure makes obvious the enormous social impact of erosion: "Four billion dollars is not trivial. You don't have to inflate it to make the point that this is an important public policy issue" (Hitzhusen, 1996, p. 8). Hitzhusen adds that as much as 65 percent of Ohio cropland is in conservation tillage or no-till, a practice adopted by commercial farmers.

Origin of the Sustainable Agriculture Movement and the Role of Extension

Unlike innovations such as fertilizers and hybrid seed varieties which were largely developed, promoted, and systematically disseminated by research institutions to farmers via extension. The SA movement, on the other hand, is largely the result of the experience of farmers, particularly limited resource farmers. Several authors trace the sustainable agricultural movement, particularly in the U. S., to farmers who felt they were losing control as the ultimate decision-makers of the land. However, the big push for SA began in the early 1980s, with the emergence of the concepts of "regenerative agriculture" (Rodale, 1983) and "ecological interaction" (Harwood, 1990). The first organized and defined movement of growers with a sustainable philosophy was the bio-dynamic movement, born from Rudolf Steiner's anthroposophy lectures, in 1924. From 1930 to 1960, another school of thought developed from biodynamics, focusing on the importance of humus in agriculture and on the adverse effects of synthetic fertilizers. In 1943 Sir Albert Howard's An Agricultural Testament founded the roots of ecological agriculture. These ideas were also advocated and expanded through works of Lady Eve Balfour, ***The Living Soil*** (1943); Faulkner's Plowman's Folly (1943); J. I. Rodale's Pay Dirt (1945); Rachel Carson's Silent Spring; and Louis Bromfield, among others. All these writers debated sustainability concepts of wholeness, ecological models, the fragile relationship between humans and the environment, and new farming practices.

What is clear from the literature on sustainable agriculture, is that contrary to expectation, Extension agents are not the prime movers; rather, they remain largely sceptical observers (Agunga, 1995). Many U. S. Extension systems are just beginning to show interest only because commercial farmers are beginning to adopt SA practices, such as no-till and conservation farming. Created in 1914 by the Smith-Lever Act with the specific purpose of "diffusing among the peoples of the United States useful and practical information on subjects relating to agriculture and home economics, and to encourage application of the same," the Cooperative Extension Systems of many states now find they must promote sustainable agriculture. But, if Extension is not to take its usual top-down communication approach to innovation diffusion, it must first find out what sustainable agricultural farmers' information and communication needs are before designing educational campaigns to address these concerns.

In Ohio, a number of sustainable agricultural farmers' organizations exist, such as the Ohio Ecological Food and Farm Association (OEFFA) and the Innovative Farmers of Ohio (IFO). For extensionists to know what the information and communication needs of these farmers are, they must ask them. This was precisely the strategy used by these researchers.

Purpose of The Paper

This study interviewed farmer-members of the Innovative Farmers of Ohio (IFO) organization, to find out what their Extension communication and information needs were. The specific research questions were:

1. To determine IFO farmers' attitude toward Extension;
2. To identify IFO farmers' information sources on environmentally sound agricultural practices;
3. To examine the nature of communication among IFO farmers; and
4. To assess the implications of the findings for agricultural communication researchers.

Methods

This study utilized a stratum of the IFO population, that is, only those members for whom farming is the primary source of income. The stratum was drawn from an IFO directory and verified by Charles Eselgroth, president of IFO. A pilot test for validity was conducted using a panel of experts interested in SA, drawn from the Department of Agricultural Economics at The Ohio State University, OSU Extension, Program Coordinators and graduate students specializing in SA. The Crombach-Alpha test for reliability was conducted by measuring internal consistency in the study's 10 main constructs. The following values for Alpha were obtained: (1) .75 for "land stewardship"; (2) .44 for "communication processes"; (3) .69 for "the aim of SA"; (4) .76 for "SA agricultural practices"; (5) .77 for "information sources"; (6) .76 for "agricultural media coverage"; (7) .56 for "reliability of sources of information; (8) .55 for "motives for association"; (9) .83 for "training needs"; (10) .24 for "relationship with Extension."

The survey was conducted using a mailed questionnaire with 33 items. The census had a 100% response rate, and data were analyzed using the Statistical Package for the Social Sciences (SPSS-PC). Raw data was categorized into nominal and interval scales, summarized using descriptive statistics such as frequencies, percentages, measures of central tendency and measures of dispersion. Comparisons were made in selected variables, and sets of correlated data were analyzed and compared utilizing measures of association. Responses to open ended questions were tabulated to examine if there were common themes and opinions among respondents. These data were later summarized as nominal data using descriptive statistics and measures of central tendency.

Results

The results of the survey are presented below according to the four research objectives, as follows:

Objective 1
To Determine IFO Farmers' Attitude Toward Extension

IFO farmers' attitude toward Extension was measured using a Likert scale with values ranging from 1 (Strongly Agree) to 4 (Strongly Disagree) in response to six statements concerning Extension's support of sustainable agriculture in general and the IFO organization, in particular. Farmers agreed that Extension agents could do more to help them (Mean=1.54, Sd.=.66). They also agreed that until recently many Extension agents had a negative attitude toward SA practices (Mean=1.63, Sd.=.69). IFO farmers disagreed that Extension agents' attitudes are changing for the better in terms of supporting SA (Mean=2.38, Sd.=.70). They also did not feel that the Ohio Department of Agriculture is supportive of SA practices (Mean=3.17, Sd.=.69) [See Table 2 below].

Table 2
IFO Farmers' Opinion Regarding Their Relationship with Extension (N=70)

Statements	Mean	Sd
Extension agents can do more to help SA farmers	1.54	.66
Extension agents have negative attitude toward SA practices	1.63	.69
Use of chemicals with farm animals should be restricted	2.13	.99
Use of chemicals and pesticides on crops should be restricted	2.23	1.00
Extension agents' attitude with SA is changing for better	2.38	.70
ODA is fully supportive of SA practices	3.17	.69

Likert Scale 1=Strongly Agree to 4=Strongly Disagree

IFO farmers expressed willingness to share their experiences with Extension in a more interactive way; however, they rejected Extension information delivered to them in a top-down fashion. Under Rogers' (1995) classification of innovation adopters, IFO farmers can be viewed as SA innovators, that is, they, not Extension agents, are the initiators of SA change. Therefore, the role of Extension under the SA movement, seems to be that of a facilitator--helping IFO farmers to go in directions they deemed desirable.

Objective 2
To Identify IFO Farmers' Information Sources on Environmentally-Sound Agricultural Practices

Given the novelty of sustainable agriculture and the apparent unwilliness of extension agents to promote it, the question was where these farmers got their information on SA practices? IFO farmers indicated that credibility of source is an important factor in evaluating information. Their preferred and

Table 2
Sources of Innovations for IFO Farmers (N=70)

Sources	Mean	Sd
Practical Farmers of Iowa	3.68	.97
Other members of IFO	3.66	.90
Rodale Research Center	3.55	.96
OEFFA	3.45	1.03
Neighboring farmers	3.31	1.06
OARDC researchers	2.92	1.05
University Experiment Stations	2.68	.97
OSU Extension	2.65	1.00
Ohio Farmers Union	2.6	1.10
Ohio Department of Agriculture	2.27	.94
Ohio Farm Bureau	2.06	.90
Other (f=9)	3.78	1.48

Likert Scale 1= Not Credible to 5=Very Highly Credible

most reliable sources of information included the Practical Farmers of Iowa newsletter, IFO members, publications from the Rodale Research Center, OEFFA members and other neighboring farmers (see Table 2). Although 88% of IFO farmers are aware of Extension information sources such as educational programs and on-farm visits, they rarely used them as a source of knowledge.

Objective 3

To Examine the Nature of Communication Among IFO Farmers

IFO farmers like to share information, that is, to mutually exchange ideas with others. The study results showed that IFO farmers belong to associations where they can get together to share information on SA practices. This was one of the main reasons cited for belonging to organizations. On a Likert scale ranging from 1 (Not Important) to 4 (Very Important), farmers were asked to indicate why they belonged to SA organizations: 1) to promote the cause of SA was the first most important ranked statement (Mean=3.42, Sd=.65); 2) to learn about new SA practices (Mean=3.36, Sd.=.73); 3) to benefit from cooperative efforts (Mean=3.20, Sd.=.68); and 4) to increase profit margin (Mean=2.95, Sd=.99). The least cited motive was to gain access to insurance (Mean=3.86; Sd.=.39) [See Table 3].

Table 3
Why IFO Farmers Belong to Associations (N=70)

Motives	Mean	Sd
To promote the SA cause	3.42	.65
To learn about new SA practices	3.36	.73
To benefit from cooperative efforts	3.20	.68
To increase profit margin	2.95	.99
To influence public policy	2.81	.96
For a sense of community	2.81	1.01
To have political influence	2.48	.95
For fun	2.40	1.03

To gain access to insurance	1.49	.88
Other (f=7)	3.86	.39

Likert Scale 1=Not important to 4=Very Important

IFO farmers wanted to be active participants in the communication processes of sharing information about SA. They liked to share information not only with peers but also with the general public. They also wanted better communication interaction with other researchers to exchange information on SA.

IFO farmers' willingness to participate in communication processes was measured using a Likert scale ranging from 1(Strongly Agree) to 4 (Strongly Disagree) on six statements. Respondents strongly agreed that: 1) they have a wealth of information to share with other farmers, researchers and extension workers (Mean=1.69, Sd.=.60); 2) they are willing to give interviews to reporters about their experiences (Mean=1.94, Sd.=.48); and 3) they have few outlets to share economically important SA practices with others (Mean=2.12, Sd.=.67). Contrary to the findings by Roling and Engel (1991) that progressive farmers do not want to share information that is highly to lead to increased productivity with other farmers, IFO farmers show a willingness to share ideas. For example, there are willing to: 1) to hold on-farm tours to share knowledge from their experiences (Mean=2.18, Sd.=.80); 2) to have Extensionists and research experts help them conduct their on-farm research (Mean=2.29, Sd.=.84); and 3) are not satisfied with recommendations from state experimental stations (Mean=3.03, Sd.=.74) [See Table 4 below].

Table 4
IFO Farmers' Communication Activities and Needs (N=70)

SA farmers...	Mean	Sd.
... have information to share	1.69	.60
... are willing to give interviews on their experiences	1.94	.48
... have few outlets to share ideas with others.	2.12	.67
... are willing to hold on-farm tours to share experiences	2.18	.80
... would like Extension/research to help them with on-farm experiments	2.29	.84
... are satisfied with recommendations from experiment stations	3.03	.74

Likert Scale 1=Strongly Agree to 4=Strongly Disagree

IFO farmers expressed concern about information channels and SA coverage (see Table 4). They would like to have more outlets to share their experience with others, and their current preferable communication methods were: 1) conversations with their neighboring farmers and family; 2) meetings of the organizations to which they belong; 3) interviews to reporters in newsletters; and 4) sharing experiences in on-farm tours.

Objective 4

To Assess the Implications of the Findings for Agricultural Communication and Other Researchers

The study findings described above have implications for agricultural communication and other researchers interested in the sustainable agriculture movement. The following implications require a concerted effort on the part of researchers and policy-makers.

1. Popular and agricultural media appear to be inaccessible to SA information sources. If people are to benefit from the experiences of SA farmers then there needs to be an opportunity for them to share their experiences with other farmers and the general public. Agricultural and extension communicators would help in this regard by packaging sustainable agriculture information and disseminating that to interested publics.

2. There is a need to improve the flow of information between the Extension agents and IFO farmers. Almost 70% of IFO farmers rarely use information, 88% of them feel Extension agents have a negative attitude toward SA, and 94% believe that agents could do more to help the SA cause. This last point provides room for working together. Agricultural communicators can help facilitate dialogue between the two parties.

3. Some of the training needs indicated by IFO farmers are already the focus of some of the Ohio State University Extension programs. For example, table 6 shows the training needs that were expressed by IFO farmers. Fortunately, The Ohio State Extension's sustainable agriculture program created in 1990 to cater to the sustainable agriculture farmer needs, has began to provide training in these aspects. The Integrated Pest Management Program (IPM) as well as the Integrated Crop Management (ICM) address farmers and general public concerns about food safety regarding pesticides, herbicides and nutrients use. The Low Level Radioactive Waste Education developed by the OSU Extension Community Development Program provides information and education on waste management. Some of the management topics requested by IFO farmers, such as creative problem solving and farm management, may be addressed by Project Excel, an OSU Extension initiative (OSU Extension Annual Report, 1995). But it is not enough for extension to simply create programs; it must let SA farmers know that help is available.

Table 5
IFO Farmers' Training Needs (N=70)

Topics	Mean	Sd
Marketing of agricultural products	4.10	.97
Weed management in ecological agriculture	4.09	.93
Soil fertility management	3.91	1.03
Role of organic matter in crop production	3.90	1.08
Pest control	3.64	1.21
Holistic or integrated resource management	3.51	1.13
Tillage practices	3.42	1.20
Soil conservation	3.18	1.27
Finance management	3.06	1.06
Grazing (seasonal and rotational)	3.01	1.42
Research design	3.01	1.20
Other (f=8)	5.00	.00

Likert Scale 1=Not Needed to 5=Highly Needed

4. There is a need to improve the flow of information between state experimental stations and SA farmers. Almost 80% of IFO farmers said they were not satisfied with the recommendations coming from experimental stations, although 57% found the information reliable. A significant finding was that 85% of IFO farmers want to conduct their own research. Thus, the opportunity exists for researchers at experiment stations to conduct "on-farm" research by teaming- up with the farmers.

5. IFO farmers like extension agents who are eager to listen and learn from their experiences. Over 74% of IFO farmers expressed a willingness to share their experiences. The question is whether extension agents are willing to depart from the traditional land-grant approach of taking findings from experiment stations to farmers and to begin to engage in collaborative processes with farmers and researchers to generate scientific findings from farmers' farms.
   A reorientation of extension workers through training may be necessary.

6. The study revealed that over 97% of IFO farmers learn from their peers which stresses the importance of interpersonal communication in knowledge-sharing. This fact brings the need for agricultural communication professionals and researchers to study and further understand the communication patterns that allow diffusion of an innovation, such as SA to occur.

7. Still another implication of this study for researchers relates to the ability of Extension workers to deal with diverse clientele. An effective way is to study the needs of each group, the nature of communication among members, and the kinds of Extension information these client groups need.

Conclusions

The study set out to discover the extension communication and sustainable agricultural information needs of the Innovative Farmers of Ohio. The study found that although Extension has been slow in promoting the concept of sustainable agriculture, the IFO farmers are eager to do so themselves. However, they will welcome Extension's help. One conclusion of the study is that there is a need for Extension to serve sustainable agricultural farmers as one of its constituencies. A second conclusion is that Extension should be open to innovations of all kinds. It must be the responsibility of the farmer, not Extension, to determine which innovations to adopt. A final conclusion is that if Extension is to effectively serve sustainable agricultural farmers, then it must assume a facilitative role, not a dominant one.

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Session G **International Education**
Session Chair - William Thuemmel
Roosevelt Room

TITLE: International Educational Needs of Iowa Agribusiness
AUTHORS: Joe Dale, David Acker, August Ralston, Steffen Schmidt, Mack Shelley
Iowa State University
DISCUSSANT: Mary Lou Carlson

TITLE: The Collegiate International Experience: Criteria For Success
AUTHORS: Julie Ann Tritz and Robert A. Martin
Iowa State University
DISCUSSANT: Bob Maxwell

TITLE: Perceptions of Leaders of the National Young Farmers Educational Association Regarding International Agriculture Implications for Agricultural and Extension Education
AUTHORS: Kamal A. Elbasher, Robert A. Martin
Iowa State University
DISCUSSANT: Bob Maxwell

TITLE: Recent Graduates Perceptions Regarding the Infusion of a Global Perspective into the Curriculum of Selected Land-Grant University Colleges of Agriculture
AUTHORS: Joe Dale, Robert Martin
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International Educational Needs of Iowa Agribusiness

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Introduction

The number and scope of international interactions and interdependencies has increased dramatically in recent centuries as has the number of people affected by them (Anderson in Pike and Selby, 1988). Factors that have shaped perceptions of global interdependence of the world include social change, rapid technological change, and particularly, economic interconnectedness. In agriculture, we have recently seen the development of an evolving international agricultural system based upon international trade (Schuh, 1985).

Global interdependencies in agriculture trade dictate an evolving set of human resource requirements. A major concern of many multi-national corporations is meeting their needs for international managers (Evans, 1989). Some multi-national corporations have responded with training programs to prepare employees for overseas assignments (Tung, 1984). In Iowa, Wirth and Martin (1995) found that agribusinesses favored the inclusion of international perspectives in educational programs to prepare students for a global economy.

Educational institutions have responded with a movement to internationalize curricula which began in the post World War II era and was perhaps most prominent in the late 1960's (Hicks and Townley, 1982). However, education in agriculture may still require additional attention to improve international skills and knowledge. For example, a study of 277 students in agronomy classes at the University of Nebraska found their knowledge of international agriculture to be lacking (Mason, et al., 1994).

This paper reports the results of a survey to identify and assess the international education needs of Iowa businesses. The purpose of the study was to enable Iowa State University to 1) improve services to Iowa citizens and, 2) internationalize Iowa State University curriculum to prepare students to operate in a global economy. This paper specifically addresses the international educational needs of Iowa agribusiness. The results will enable Iowa State University and other educational institutions to respond by improving existing programs, and developing new educational programs to meet these needs. The survey was supported by a grant from the Iowa State University Council on International Programs.

Methods

Questions for the survey were developed by a team of researchers and subsequently pilot tested. The survey was mailed to Iowa business firms. The sample was constructed by combining 5004 names from the 1996 Harris Selectory of Iowa manufacturers with a list of 1007 Iowa firms that were invited to attend a business conference sponsored by Iowa State University. Duplicates from the two lists were removed for a total sample size of 4323 Iowa businesses. The response rate was 440 or slightly more than 10 percent of the sample size.

Profile of Responding Agricultural Business Firms

The 440 Iowa business firms that responded to the questionnaire were asked to identify the sectors in which they conduct business. One hundred and ten firms responded that they were involved in agribusiness and 71 reported they were involved in agribusiness processing. This paper focuses only on the responses from these agriculturally related businesses. The total number of agricultural respondents is 155 because some businesses are involved in both agribusiness and agribusiness processing.

Number of Employees

The distribution of employees of Iowa agribusinesses responding to the survey demonstrates that most are small to medium-size firms. As shown in Table 1, 70 (45.1 percent) of the responding agribusiness firms have fewer than 25 employees and over 80 percent (n=126) have 100 or fewer employees. Only 7.8 percent, or 12 agribusiness respondents have more than 500 employees.

Table 1

Distribution of Agricultural Respondents by Number of Employees

Employee Range	No. of Respondents	Percentage of Respondents	Cumulative Percentage
1 to 25	70	45.1	45.1
26 to 50	27	17.4	62.5
51 to 100	29	18.7	81.2
101 to 250	13	8.4	89.6
251 to 500	4	2.6	92.2
501 to 1,000	4	2.6	94.8
More than 1,000	8	5.2	100.0
Totals	155	100.0	100.0

Total Revenue or Sales

When stratified by total revenue or sales, 29 percent (n=43) have total annual revenues or sales of over $25 million, by far the category with the most respondents. In fact, agribusiness firms with greater than $10 million in revenue or sales account for over 42 percent (n=63) of the total agricultural respondents. Distribution of agricultural respondents by annual revenue or sales can be found in Table 2.

Table 2

Distribution of Agricultural Respondents by Total Annual Revenue or Sales

Revenue/Sales Range	No. of Respondents	Percentage of Respondents	Cumulative Percentage
Under $500,000	18	12.1	12.1
$500,000 - $1M	13	8.9	21.0
At least $1M < $2M	7	4.7	25.7
At least $2M < $4M	22	14.9	40.6
At least $4M < $10M	25	16.9	57.5
At least $ 10M < $25M	20	13.5	71.0
$25M or more	43	29.0	100.0
Total	148	100.0	100.0

Employees Engaged in International Business

Respondents were also asked to indicate what percentage of their employees were directly involved in international business activities. As displayed in Table 3, over 92 percent of responding agribusinesses have at least some of their workforce engaged directly in international activities. However, the percentage of employees involved in international activities was relatively small. Most firms (83 percent, n=129) had less than 10 percent of their work force directly engaged in international business activity. Only 11 agribusiness firms (7.1 percent) have over 50 percent of their employees engaged in international business activities.

Table 3

Percentage of Employees of Agricultural Respondents Engaged Directly in International Business Activities

Employees Range	No. of Respondents	Percentage of Respondents	Cumulative Percentage
0.00%	12	7.7	7.7
At least 1.0% < 10%	117	75.5	83.2
At least 10% < 25%	9	5.8	89.0
At least 25% < 50%	6	3.9	92.9
At least 50% < 75%	5	3.2	96.1
Over 75%	6	3.9	100.0
Total	155	100.0	100.0

Revenue from International Business Activity

Businesses were also asked to identify their total annual revenues or sales derived from international business activities. As illustrated in Table 4, over 93 percent of responding agribusinesses indicated that at least some of their revenue or sales came from international business activities. But once again, the actual percentages of income from international activities was relatively low. Most respondents indicated that their international revenue or sales fell between one and ten percent (n=95, 62.9 percent). Twenty-three respondents indicated that the percentage of their international revenues or sales was between 10 and 25 percent of their total revenue (15.2 percent). In addition, eight percent (n=12) indicated that over 75 percent of their total revenue or sales came from international business.

Table 4

Percentage of Annual Revenue or Sales Derived From International Business of Agricultural Respondents

Revenue/Sales Range	No. of Respondents	Percentage of Respondents	Cumulative Percentage
O.O%	10	6.6	6.6
At least 1% < 10%	95	62.9	69.5
At least 10% < 25%	23	15.2	84.7
At least 25% < 50%	9	6.0	90.7
At least 50% < 75%	2	1.3	92.0
Over 75%	12	8.0	100.0
Total	151	100.0	100.0

Results

The previous information provides a good understanding of the nature of Iowa agribusinesses and the importance of international business. Following is information which will provide a better understanding of the perceived needs of Iowa agribusinesses to be able to effectively conduct international business activities.

International Agribusiness Needs

The survey presented a list of 19 possible needs of businesses to conduct international activities. Table 5 presents the agricultural respondents' needs as they foresee them in the next five years. The most common response was "Leads about trading opportunities" with 61.3 respondents indicating this as a need. Other prominent needs which were indicated include information on electronic communication (58.2 percent); information on laws and tariffs (57.4 percent); market studies and marketing (56.0 percent); foreign business contacts (55.0 percent); information technology (52.9 percent); information on export documentation (51 percent); and transportation (50 percent).

Table 5

Areas of Need Foreseen in the Next Five Years For Agricultural Respondents

Rank	Need Area	Percentage of Responses	Number of Yes Resp.
1	Leads about trading opportunities	61.3	93
2	Electronic communication	58.2	85
3	Laws and Tariffs	57.4	85
4	Market studies, marketing	56.0	84
5	Foreign business contacts	55.0	82
6	Information technology	52.9	73
7	Export documentation	51.0	75
8	Transportation	50.0	71
9	Financial analysis	47.9	69
10	Effective business correspondence	46.8	65
11	Document translation	45.5	66
12	New Product/services development	45.6	63
13	Employee development training	44.1	60
14	Training in culture - specific info	42.2	60
15	Foreign language training	38.9	56
16	Environmental analysis	34.8	48
17	Packaging and processing	34.3	46
18	Political analysis	32.9	46
19	Overseas site inspections	24.8	34

As indicated in Table 5, 38.9 percent or 56 agricultural respondents replied that they foresee a need in language training in the next five years. Respondents were then asked to indicate what languages they considered a priority. A summary of responses to this item can be found in Table 6. Of the 52 agricultural respondents to this item, 43 (82.7 percent) indicated training in Spanish was a priority. Other languages receiving a strong response were Chinese (Mandarin) (26 respondents, 50 percent); Japanese (21 respondents, 40.4 percent); Chinese (Cantonese) (18 respondents, 34.6 percent); Russian (16 respondents, 30.8 percent); and French and German each with 14 respondents or 26.9 percent.

Table 6

Important Foreign Languages of Agricultural Respondents

Rank	Language	No. of Respondents Who Indicated	Percentage of 52 Respondents
1	Spanish	43	82.7%
2	Chinese (Mandarin)	26	50.0%
3	Japanese	21	40.4%
4	Chinese (Cantonese)	18	34.6%
5	Russian	16	30.8%
6/7	French	14	26.9%
6/7	German	14	26.9%
8	Portuguese	9	17.3%
9/10	Vietnamese	8	15.4%
9/10	Italian	8	15.4%
11	Malay - Indonesian	7	13.5%
12	Hindi	5	9.6%
13	Arabic	4	7.7%
14	Bengali	2	3.8%
15/16	African languages	1	1.9%
15/16	Urdu	1	1.9%

Implications

The fact that over 90 percent of the responding agribusinesses derived at least some of their income from international business and that some of their employees were involved in international activities should be of great interest to Iowa State University and other land-grant universities. Given the projections that the importance of the international aspects of agribusiness will increase (Schuh, 1985), it is clear that Iowa State University will need to internationalize its teaching, research, and outreach programs to meet the needs of agribusiness.

For the teaching program, adding a global perspective to agricultural curricula will be extremely important for Iowa businesses to have well-rounded, globally aware employees that can provide the expertise in the needs identified in this study. Also, efforts should be made to increase instruction in languages identified as important in this study such as Spanish, Chinese, Japanese and others. The need for these languages is also a clear indication of the importance of regions such as Latin America and the Pacific Rim to Iowa agribusiness. Therefore, extension, student learning, study abroad, and research programs need to be at least partly directed towards these geographic areas. Iowa State University should also strengthen its outreach program to meet projected needs of agribusinesses in topics such as leads about trading opportunities and foreign business contacts, provide information on laws and tariffs, and assist in developing international market studies and marketing plans.

It should be noted here that land grant universities cannot successfully meet all the education and training needs of the private sector. Some of these needs are undoubtedly best performed in the private sector itself. However, land grant universities have a key role to play in developing globally prepared graduates and world citizens, the human resource base upon which businesses and communities depend. Also, more than just the needs of the business community must be considered. Universities should strive to provide education, research, and outreach activities that prepare clientele of the university to be successful in multiple settings. A balance must be maintained so that social, cultural, geographic, and political considerations are taken into account in the globalization of teaching, research, and outreach functions of the university. Nevertheless, the results of this study provide important guidance to the internationalization effort at Iowa State University and can serve as a model for other land-grant universities as they globalize their teaching, research, and outreach programs.

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The Collegiate International Experience: Criteria for Success

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In 1982, a plea for world peace was made by eleven year old Samantha Smith in a letter to Soviet Union leader Yuri Andropov. That letter earned her a trip to the Soviet Union and an opportunity to better understand Russia and other related cultures. Unfortunately her life was tragically taken away in a plane crash just three years later. In her memory, the Samantha Smith Memorial Exchange Program was established, to increase mutual understanding between young people and undergraduate students of the United States and countries of Eastern Europe and the Soviet Union through educational and cultural exchanges (Gelb, 1990). Exchange programs such as this one and others have helped numerous students gain an international perspective that could not otherwise have been taught in the classroom or language class.

An international experience abroad is a part of the international education many institutions and universities both domestically and internationally are trying to administer. International education is defined as a variety of activities and programs designed to encourage the flow of ideas and people across cultural and geographic boundaries (Mitzel, et.al., 1982). Studying abroad is one facet of an international education. The central goal behind international education is the ability to produce graduates with perspectives that are global in scope (Pickert, 1992).

The mission statements of both Iowa State University and the College of Agriculture both stand behind this statement and clearly make reference to providing the resources and training to students for the global market that awaits them upon graduation. Furthermore, King (1991) and Sammons (1995) surveyed faculty and students, respectively, and both concluded there was a strong need for internationalizing the curricula in the College of Agriculture at ISU. Both studies mentioned the importance of a study abroad experience and that it serves as a key element to internationalization. However, recent data indicate that study abroad programs are not widely used by students. At ISU the percent of agricultural students studying abroad is 1.3% of the student population (ISU Study Abroad Center, 1996) and nationwide those numbers are even lower at .9% (Davis, 1994-95).

Infusing an international perspective can be challenging considering current monetary constraints and lack of commitment for international programs from university administrators and others. Although there are limited resources available, it is important to understand the significance of a study abroad experience and to clearly outline criteria to make studying abroad worthwhile.

Purpose

The purpose of this paper presentation is a philosophical explanation of the importance of an international experience for students at the collegiate level, and to identify ten criteria for a successful experience abroad program based on the experience of the authors.

Studying abroad is like a phenomenon that comes over you and changes you forever. A country, its people and their culture all have an amazing effect on anyone who has studied abroad. Perceptions are changed, thoughts challenged and most importantly, a more worldly perspective garnered. An international experience provides cultural awareness, improves communication abilities, and foreign language skills increase (Opper, Teichler, Carlson, 1990).

Despite everything that is learned while abroad, problems do arise; that is why it is crucial to have a clear understanding of what might happen in an international experience program. The following is a summary of the 10 criteria that are necessary for a successful study abroad experience.

10 Criteria for a Successful Study Abroad Experience

Criterion	**Importance**
1. Set Goals	Realize your abilities, time-frame and set goals for what you want to accomplish.
2. Expectations	Be aware of your home and host university's expectations.
3. Focus Academic Pursuits	A much richer experience will be gained if your interests are focused.
4. Resources/Contacts	Take advantage of the resources both while in your home and host country.
5. Financial Management	Learn to budget; money matters when you're away for an extended period of time.
6. Culture Preparation	Learn customs and the do's and don'ts of the country you're traveling to.
7. Identify Perceptions	Realize how you may be perceived and check-in with your own perceptions of the host country.
8. Language Training	If you're not fluent, learn some language. A working vocabulary is extremely helpful.
9. Communications	Realize we all communicate differently and that open communication is essential; both talking and listening.
10. An Open Mind	A positive attitude will only enhance your experience. Flexibility is key!

Set Goals

Goal setting is a powerful process. Webster's (1990) defines a goal as "an end that one strives to attain." According to Covey (1994: 136), it is the process of translating visions into achievable, actionable things. To carry out measurable, specific and time-bound goals is important and involves recognizing one's abilities, limitations and the overall structure of the international program.

It is important to fully understand the type of international experience one participates in, the length of stay, language requirements, and current status when setting goals. An international experience can be classified based on its purpose, which include: study abroad, work abroad, cultural exchange, and internships.

The term "study abroad" did not become commonplace until the 1980s. Prior to that the term used was Junior Year Abroad, which is still used today. Study abroad encompasses all time frames, so whether one studies abroad for a year or ten days, the emphasis is on academics. With study abroad experiences it is important to set goals that mirrors one's academic level; that is why it is often suggested to study abroad during the junior or senior years because students tend to be stronger academically and more focused during that time frame. The purpose of work abroad is basically to gain work experience in an international setting. The same purpose holds true for internship, so when setting goals a student needs to consider what competencies and skills they want to gain from this experience and to fully realize why an international setting would enhance understanding.

The purpose of an international experience drives the goals that are written, but it is equally important to consider language and length of stay. Six weeks in Prague will probably give one a better appreciation and understanding of Czech culture and agricultural practices, but the goals in this situation versus six months in Nitra, Slovakia will be different because the length allows for more time for an in-depth look at those same areas. (Tritz, 1990, 1994).

Goal setting is important regardless the program structure. Goals provide direction and purpose for what one wants to achieve. It is really important to look inside oneself and realize what you want to accomplish, so to create achievable, measurable, and specific goals.

Expectations

In relation to the first criterion, goals are set with the expectation that positive changes will occur (Covey, 1994: 138). Expectations go hand in hand with goals. To achieve each goal set by either the program or the student, certain expectations must be met.

In the Iowa State University & University of Agriculture, Nitra evaluation report, one student expressed that the "program did not live up to my expectations so my goals changed." Another student had similar thoughts, "I expected to visit farms and have an internship and didn't, so my objectives changed" (Final Evaluation, 1996). In these situations students expected to visit farms and tour agricultural production facilities and only one out of the five students did so.

The following were the overall goals (objectives) of Iowa State University, Samantha Smith Memorial Exchange 1996:

1. Provide academic training in agriculture to Slovak and American students in the United States and Slovakia.
2. Build international understanding and friendships among the participants and their communities; and

3. Help youth develop a greater understanding of their host country by learning about its history, culture and society.

These are the goals, but where are the expectations? In this particular case none were written. Often with study abroad programs expectations exist, but often not communicated very effectively either in written or verbal form. If goals are to be achieved, then what is expected is a major piece of the puzzle. Granted, circumstances are different in every situation, but overall goals must be constructed with realistic outcomes in mind. If students expect one thing and something else occurs/or doesn't then objectives are not met. Therefore we must be careful when stipulating certain ideas to reach program goals and clearly outline what's expected for all involved.

An awareness of the program expectations is important for effectively utilizing time and resources. According to Covey (1994: 223), when seminar participants were asked how much time is spent in their organizations dealing with the effects of unclear expectations, they said approximately 60 percent. International experiences deal with similar incidents. The Slovak students that were in the U.S. last spring noted they expected to have jobs to help support their time at Iowa State, but found out the process to obtain a work permit extremely difficult and time consuming (ISU/UAN Exchange, 1996).

Focus Academic Pursuits

Studying abroad usually occurs during the junior year when most students have some direction in terms of their academics. Areas of specialization are often required by most departments during the junior year. More will be gained if one's academics are focused because goals will often mirror what one wants to achieve academically.

> During my junior year, I had aspirations of going into Agricultural Law after graduation, so the semester I was in Slovakia my academic pursuits were very focused. I took a class in Ag Law while at the University of Agriculture, Nitra spent a considerable amount of time getting to know the staff and their area or research. In fact, I traveled to Prague and met with several law professors at the University of Agriculture, Prague and did the same in Budapest. It was an extremely beneficial time for me because I had a focus and centered most school activities around that (Tritz, 1994).

It is amazing how having a focus will benefit an individual. Granted diversity in coursework and gaining new perspectives are important as well, but it is important to look at the big picture and where one will be in 5 or 10 years, so as to gain the most from an international experience.

Resources/Contacts

Utilizing the resources for a study abroad experience can be overwhelming considering the information that exists. Resources both at home and while abroad are important information sources. The resources used at home will be part of the cultural preparation one goes through, while those abroad may serve in the same capacity, in addition to other reasons.

The Study Abroad Center on campus is a logical place to start. The Study Abroad Center at Iowa State University has information on tourism, culture, entertainment, restaurants, youth hostels, and many others in the country one is traveling to. This service offers this same information for nearly 130 countries world-wide.

The information highway is another information-packed place to gather details. One can get a passport, contact an embassy, or find out tips on what to pack, directly through the INTERNET. The INTERNET is a goldmine of information just waiting to be tapped.

Another resource would be students from the country one is planning to visit. Exchange programs offer the opportunity to meet with students, interact with them and get a better feel of the language, customs and maybe even possibilities to taste some food.

Tapping into those students who were past participants will provide tremendous insight as well. They've been there, they've seen and lived through it all. They know what to expect, what the food is like, what the people are like and sometimes most helpful, what it is like to be an American in that setting. One student that participated in an exchange to the Ukraine felt that the meetings with past participants were the most beneficial because it gave insight to what the country and its people were really like (Tritz, 1996).

Finally, in terms of resources and contacts, it is important to devise a list of important numbers; starting with the project coordinator, professors, etc., and be sure to include the US Embassy and/or British Embassy in the country you'll be living in. It has been recommended to register with them prior to departure in case of emergency. The unexpected can happen in a moment's notice and their knowledge of your being in the country can make an emergency go smoother.

Financial Management

Financing a study abroad can be an intimidating task considering the cost of airline tickets, room & board, and all the necessities on one's packing list. However, careful budgeting should alleviate money shortages and an overall smoother program.

A monthly itemized budget works best because it clearly outlines your expenditures over the course of a month. Certain programs require total payment of everything, from airline tickets to food, prior to departure; whereas other programs require only participants to pay for items such as: airline tickets, insurance and other incidental fees prior to departure. Once in-country, a monthly budget will better balance possible income and expenditures. A budget should include items such as: room & board, health insurance, books/supplies, entertainment/activities, souvenirs, travel (local), incidental fees and some pocket money.

Also, to exchange money, it is always recommended to exchange money at a bank. Exchanging money on the black market, is first of all, illegal in many countries and secondly, it's dangerous. However, in certain parts of the world the black market is "safe" and only readily accessible way to change money (Tritz, 1996).

Many of the items listed above will vary depending on the program, country and the lifestyle of the participant. Fixed costs for any program are travel to and from the host country, food and housing. These are essential wherever your experience takes you. From there it is a matter of the lifestyle one chooses.

Take into account possible events that are unforeseen or unavoidable. A golden rule when traveling abroad is to take $500 extra, if possible. Emergencies can occur in the blink of an eye and leave one in a precarious situation. Wiring money is an option in some parts of the world, but not others. A good budget always leaves a little flexibility.

Cultural Preparation

What do we mean by culture? According to Applebaum et al (1970:86) culture is the cumulative deposit of knowledge, experience, attitudes, meanings, hierarchies of status, religion, timing, role expectations, spatial relations, and concepts of self, the universe, and the relationships acquired by a large group of people over the course of time.

Learning all of this can be a daunting task considering one often has to do a variety of other things. Keep in mind "culture" is a combination of everything mentioned above and that knowing everything about a country prior to departure is difficult to achieve, if not impossible.

It is important to learn about culture shock and how you will be affected by it. Your first experience can bring on feelings of homesickness, certain illnesses due to the change in food and water and many other things (Tritz, 1990). However, with experience a new country or new situation is handled better because psychologically we are better prepared. Our bodies don't always adjust with experience, but our mindset is more open and the adjustment period gets smoother with more travel experience (Tritz, 1996).

It is important to realize how studying abroad affects us. According to Hawks (1994), the level of enthusiasm is highest during the first month. Everything is new, you are new to the culture; you're the new people in town and a part of all the attention that is given. However, that feeling soon wears off as time goes on; the newness of the experience wears off and sometimes homesickness sets in. From here students either find the enthusiasm they had during the first month by really getting back into the culture or as with some students; they experience culture shock in more extreme forms. The following graph depicts the level of enthusiasm a student goes through over a six month period (Hawks, 1994: 63).

It is important to find pertinent information such as: cultural dos and don'ts, eating habits, food preferences, drinking customs, personal space, etc. Even more important, one should have a complete physical and the proper shots, noting any allergies and be cognizant of your health insurance and its policies.

> I came down with an allergic reaction to something while traveling through Prague. My legs had a serious case of edema and I was bed-ridden for over a week with a high temperature just before Christmas. It was a difficult time to be away from home because I had difficulty communicating with the doctors and actually finding out what caused the allergic reaction. That experience taught me two lessons. First, in addition, to getting all the necessary shots, one should get a physical. Secondly, be very cognizant of what you eat and drink at all time. Granted people from that culture have eaten and drank those foods their entire life and their bodies are used to it, but it takes time for our bodies to adjust. Never assume something is fully cooked or that the water is clean (Tritz, 1994).

Preparing for everything is impossible, but remember the unexpected can happen.

> It was my third day in Tashkent and Shelley, who was the other ISU student, had just arrived from New Delhi. I was excited to see her and we were both anxious to get started on our research. Within a matter of 24 hours, Shelley had came down

> with a serious case of appendicitis and the doctors had recommended to operate. I can hardly describe the fear in Shelley's voice or the knawing ache in my stomach. What to do?. Here Shelley was half-a-world away, with no English speaking doctor, and medical facilities that were less than desirable. Along with my coordinator, I tried to make contact with the US Embassy in Tashkent at 1:00 in the morning, to get an English speaking doctor to see Shelley. Luckily for Shelley, we found one. Little did I know how difficult that would be. That experience taught me how an emergency such as this can be handled and that cultural preparation is important. Registering with the embassy, having the phone number of an English-speaking doctor in Tashkent, and clearly understanding what our health insurance covered were things that could have been taken care of prior to departure. Emergency situations like this one make you realize that the little things really do matter (Tritz, 1996).

Identify Perceptions

Applebaum et al (1973: 88) indicated that human perceptions should give us a accurate picture of our social environment. Unfortunately, it seldom does, because various cultural elements prejudice the meaning we attach to social stimuli. . Perceptions will vary with each individual and how we view the world. Several common views are ethnocentrism, the world view, absolute value system, stereotypes, and prejudices.

According to Applebaum et al (1973: 89, 90) ethnocentrism is the "unconscious tendency to view and judge other people by our own customs and standards. Our ethnocentric perception hampers intercultural communication because we are unable to view objectively customs or beliefs that differ from our own." Understanding why a society does what it does is more important. Different isn't good or bad, it is just different; therefore, judging a society based on one's own values is not fully appreciating the country and culture one is trying to experience.

Stereotypes and prejudices are described as an a set of attitudes applied to a person or group of people based on their class or position in society (Applebaum, et.al 1973:91). Stereotypes and prejudices are often fueled in many ways by the media. Television serves as one very popular way of transmitting what is happening around the world to the comfort on one's own home. The perceptions viewed in these shows lead to stereotypes and generalizations for an entire country. For women in particular, these shows often portray American women as sex objects and cases of rape, sexual assault, and harassment have been documented in several countries. The experience of being different can have both positive and negative effects. Positive in the sense, that one is often showered with attention and privileges that are not often granted to others. Negative by means of verbal abuse and various forms of harassment (Tritz, 1996).

It is important to identify perceptions people from your host country may have and equally important to have a sense of self-awareness by knowing what perceptions you have of the country you'll be in. From politics to lifestyles, people around the world are perceived in different ways. Being different isn't good or bad, it's just different; therefore it is important that each student going abroad is cognizant of various world views and attitudes.

Language Training

Many of the study abroad opportunities offered under the auspices of International Agriculture Programs do not require fluency in a second language, because many of the classes and tours offer translators to accompany students. However, this should not be seen as a crutch because the rewards of knowing some language prior to going are very beneficial.

In the Slovak Student Exchange (1996) nearly every student wished more language training had been available prior to leaving. These students lived with host families and nearly all of these students felt that more language training would have made the transition period easier. If fluency is not required for a program, it is important for three reasons to learn some language.

First, attempting to speak and communicate with people of a different culture will show an initiative and a willingness to assimilate and learn about your host country. A lift of the eyebrows and a smile with the person you're communicating with will be a good indication that trying is important. Also, language training will be extremely beneficial when traveling within a city, country, when shopping, when going to the restaurant and many other times; it will give you that feeling of independence. Finally, language skills can be extremely helpful when found in precarious situations.

Communication

When traveling abroad we obviously will encounter people from other cultures. If we interact with people from abroad, we are engaging in intercultural communication. According to Applebaum et al (1973: 99), intercultural communication occurs when the speaker or communicator is from one culture and the listener or audience is from another. We all communicate differently and is important to realize that communication in settings other than our own can be challenging, as well as rewarding.

We communicate through the use of verbal, non-verbal communication and listening. Language provides the foundation for all three. It is very much a part of our culture and gives way to problems by defining certain words and in some cases, certain words don't exist in one language, but are found in another. For example, women are defined differently in different parts of the world. In certain parts of the world, one becomes a woman when she gets married, whereas here in the United States martial status may or may not be an indication of womanhood (Tritz, 1994, 1996).

Non-verbal communication consists of facial expressions, actions, and mannerisms. It is a common experience among people who travel to find difficulty in interpreting the facial expressions of peoples of cultures other than their own. Such expressions as shaking our heads from side to side as an indication of "no" is different in various parts of the world. Therefore, understanding and being cognizant of non-verbal cues will help in understanding the verbal communication and enhance listening.

It takes a lot of practice to become a good listener. In an international setting, listening skills are extremely important; getting directions to the bus stop, listening to the waiter describe the menu or listening to a lecture on milk production are all examples of when listening is important. A different language will challenge everyone's listening skills because it really takes a concentrated effort on the part of the listener. As mentioned earlier, language is the foundation for verbal, non-verbal and listening and all three are important for communicating effectively in international settings.

An Open Mind

An international experience is a beneficial and worthwhile endeavor and the correct attitude is important in seeing each of the above mentioned criterion through. A positive attitude will benefit a person ten-fold. An international experience offers so much in terms of technical skills, culture, history, politics, language, geography and so much more. The ability to absorb all this is only enhanced with the right frame of mind.

One should take advantage of every opportunity that presents itself; it is the only way to really experience a culture. It is all about risk-taking. One is taking a risk just by stepping outside of their own culture, so it is important to build on each and every experience while you're overseas. An open mind and a positive attitude will not only set the stage, but it will also, enhance the overall international experience.

Educational Importance

Today there is recognition of the fact that there is a direct connection between educational and informational exchange and economic development (Davis, 1995). International experiences provide this reciprocity of information and the insight into another country's system. Internationalization is only as important as we make it. It is necessary to act on the mission statements from universities to get university administrators to commit both academically and financially to study abroad programs.

The story of Samantha Smith portrays how someone so young had a vision of someday understanding a culture so unlike her own. Her efforts are still seen today and it has provided an opportunity for many students to see firsthand the changes sweeping over Eastern Europe. The journal entries of the many students that have been to Eastern Europe and other places around the world will attest to the tremendous amount of information gained from an experience abroad. Often one only needs to look into the eyes of an exchange student as they talk about their trip, to realize that for them it was an "experience of a lifetime".

Studying abroad is like a phenomenon that comes over you and changes you forever. A phenomenon is unique and unusual for each individual, just like each trip abroad. An international experience is a worthy educational tool and as educators and administrators, it is our responsibility to ensure the next generation is awarded this same opportunity.

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Perceptions of Leaders of the National Young Farmers Educational Association Regarding International Agriculture Implications for Agricultural and Extension Education

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Introduction

International agriculture and global education have intrigued educators for years. Agricultural educators have noted the need to expand awareness of the global village through infusion of international concepts into the agricultural education curricula for adult and young learners.

According to Maxwell (1990), forces of interdependence are working at unprecedented speeds and levels of complexity for all countries. However, activities done by people in one country can have a direct impact on other countries. Many people are becoming aware of this situation and are looking for ways to inform other people about it (Perez-Morales, 1993).

The ultimate competitiveness of United States agriculture in the global arena depends upon the availability of individuals who know and understand the global nature of agricultural enterprises. *America 2000* (1990) targets the need for an educated citizenry having the knowledge and skills to compete in a global economy. It states that "all our people must be able to think for a living, adapt to a changing environment, and to understand the world around them... we must realize that education is a lifelong pursuit" (United States Department of Education, 1990: 35).

United States' agriculture faces perhaps no greater challenge than to keep constituents updated on the events shaping changes in today's global economy. International forces often provide impetus for these changes. During the 1970s, international trade was a key to farm prosperity. However, in the 1980s, international forces contributed to a declining farm sector and the subsequent resource adjustments in agriculture. For the 1990s, global events will continue to place a high level of uncertainty into farm and rural community decision-making (Rosson, 1991).

Using agriculture as a context for teaching international concepts has become widely accepted. Those in general education also recognize the importance of understanding agriculture from an international perspective. McBreen (1989) pointed out that most of the data related to United States agriculture and its economy pointed directly to a need to have a more knowledgeable citizenry. Agricultural education has shown it is capable of providing leadership to its clientele to help understand the world economy and their place in it. Thus, agricultural education professionals must play a leadership role in bringing international concepts to the local community and school system. This leadership role would extend to assisting local communities to understand the impact of international decisions on their future.

In this changing world, agricultural educators can no longer educate effectively by functioning the same way their predecessors did. Today's environment is no longer confined to a county, state, or even the nation, it is global. To deal programmatically with worldwide technological advancements, mass communications, and the complex intermeshing of markets around the globe, we, agricultural educators, must be prepared. Such preparation can help clientele understand the internationalization of issues or concerns that we once viewed in a national context (Richardson & Woods, 1991). Further, Richardson and Woods added that the impact from the international arena on our lives and the decisions we make provide vast opportunities and challenges for agricultural education. How do we meet these challenges effectively? Realistically, our only viable means is by adding international dimensions to the current educational programs.

Lavery (1990: 3) summarized his speech to the annual conference of the Association for International Agricultural and Extension Education (AIAEE) by saying that "the essence of successful development programs in the future will be well informed and educated citizens who have a knowledge of the global economy and have an understanding and appreciation that we are emerging into a very competitive global economy and we can learn from each other. Therefore, collaboration, partnership, and linkages are essential; public and private sector involvement is essential for sustainable development and economic cooperation and growth; and the key to success is development of human capital at all levels."

There is an urgent need for developing an international awareness among people who work in the agricultural sector (Martin, 1992). Moreover, Martin continues, a high degree of knowledge of world agricultural issues is essential for those who are involved in the global market. Changes in one nation's agricultural system is unavoidable connected with those of other nations. It is more important that people who pursue careers in agriculture should learn as much as possible about agricultural systems around the world and their impact on production, processing, and marketing of food and fiber. As Martin suggests, in addition to these national needs for global awareness, there is a critical need to develop educational programs in agriculture based on cultural diversity of all countries.

Purposes of Study

The primary purpose of this study was to determine the perceptions of leaders in the National Young Farmer Educational Association (NYFEA) regarding international agriculture issues and their implications to agricultural and extension education. An additional purpose was to identify and analyze international agricultural knowledge and skills needed by members of the NYFEA. Specifically, the objectives of this study were to: identify the extent to which leaders in the NYFEA perceived selected issues in international agriculture to be important, identify and assess the relative importance of selected technical agriculture topics related to international agriculture and demographics.

Methodology

The population for this study included all the leaders of the NYFEA in 21 states, who organized educational programs for young farmers for the year 1994-95. A list including all names and addresses of the leaders in the NYFEA was obtained from the Executive Director of the association. The list had the names of 845 leaders in the NYFEA. This list served as the population of the study. A sample size of 264 leaders was randomly selected from the NYFEA leaders population. This sample represented 31.4% of the population. Sampling error was thus controlled with a 95% confidence level. There was an over-sample drawn because of a concern about response rate.

The study was conducted using descriptive survey methods in the form of a mail questionnaire. The questionnaire consisted of 108 items and was arranged into three sections. Section one was designed to determine the perceptions of leaders in the NYFEA regarding issues in international agriculture. In section two the leaders were asked to indicate the degree of importance and/or the level of interest in topic areas related to international agriculture. Section three was designed to identify the leaders' demographic characteristics. The questionnaire was sent out to 264 leaders in the NYFEA. A total of 153 usable returns were received for a 58.0% response rate.

The coded data were then analyzed using the Statistical Package for the Social Sciences for the personal computer (SPSS-PC). The alpha level was set *a prior* at .05 for all tests. Descriptive procedures were used to determine frequency, percentages, means, and standard deviations of the responses. The Cronbach's alpha reliability test was also computed on each of these three sections. The coefficient for items in the section titled "perceptions regarding selected issues in international agriculture" was .78. The alpha coefficient for items in the sections entitled "level of importance of topic areas in international agriculture" and the "degree of interest in learning more about international agriculture" were .96 and .95, respectively.

Findings

On the perceptions scale, the leaders of the NYFEA held slightly favorable perceptions regarding selected issues in international agriculture. The overall mean rating for the perception scale was 3.85, falling in the middle of the "agree" category (3.50 to 4.00). In this study, the respondents gave a strong indication of a need for some form of a global outreach program in international agriculture education to help farmers understand world markets. This perception statement received a mean rating of 4.33. Respondents also indicated that education in international agriculture should be offered to help farmers compete in world markets. This perception statement received a mean rating of 4.31. In addition, respondents felt strongly about adding international perspectives to educational programs in agriculture. This perception statement received a mean rating of 4.28 (Table 1). These findings might indicate to some that the leaders of the NYFEA are in favor of internationalizing educational programs in agriculture for young and/or adult farmers in the U.S., and therefore in agreement with Dorner (1989 : 85) who stated that:

"Effectiveness in today's dynamic world requires a citizenry whose knowledge is sufficiently international in scope to cope with global interdependence."

The low ranking of the statements "U.S. farmers have no need for international knowledge and skills in agriculture" (mean = 1.57), and "even if agricultural training was offered related to international agriculture, agricultural practices will not change" (mean = 2.61) could be interpreted in a positive manner (Table 1). The relatively low rating suggested disagreement with the statements which means that there was potential that agricultural practices could be improved with the introduction of international agriculture training programs and that U.S. farmers could learn some technical knowledge in international agriculture which might help in improving agricultural practices.

The findings of this study indicate that, overall, the respondents were in agreement with the perception statements regarding selected issues in international agriculture. However, certain demographic characteristics were also found to influence the respondents' perceptions. The data indicated that respondents who spent some time in foreign countries tended to agree more with the perception statements dealing with selected issues in international agriculture (Table 2). This result is, therefore, consistent with the Akpan (1994) study, which found that "respondents who had traveled to a foreign country favored internationalization of the curriculum more than those who had not" (p. 128).

In identifying and assessing the relative importance of selected technical topic areas in international agriculture, the leaders of the NYFEA tended to agree that "marketing U.S. products in foreign countries," "impact of foreign pests and diseases on U.S. agriculture," "crop pesticides used by farmers in other countries," "new crop varieties from other countries," "impact of international livestock health issues on U.S. agriculture," and "chemical safety problems in other countries" were the most important topic areas in international agriculture which should be infused from a global perspective. This finding was consistent with Elbashir's (1991) study, which found that "topics related to livestock and crop production and agribusiness education such as: marketing, pests and diseases, crop pesticides, new crop varieties, and chemical safety problems in other countries received the highest ratings in the four broad areas" (p. 77). Of the 34 topics rated by the respondents, only two statements received a mean value of less than 3.00. Landscaping and turf management problems in other countries were viewed by the respondents as of "little importance" to be added to the education programs in agriculture (Table 3). This finding was also consistent with Elbashir's (1991) and with Omer's (1987) reports which indicated that the low ratings in horticulture topics may be due to lack of knowledge concerning these topics and/or a lack of emphasis on horticulture topics in the educational programs for young and adult farmers.

Table 01. Means, standard deviations, and rankings of perception statements regarding selected issues in international agriculture reported by leaders in the NYFEA*

Rank	Perception statement	n	Mean	SD
01	The farmer is highly productive compared to other countries of the world.	152	4.64	.56
02	The U.S. produces high quality livestock compared to other countries of the world.	153	4.63	.56
03	The U.S. produces high quality crops compared to other countries of the world.	153	4.59	.61
04	Education in international agriculture should be offered to help farmers to understand the world markets more efficiently.	153	4.33	.54
05	Education in international agriculture should be offered to help U.S. farmers compete in world markets.	153	4.31	.58
06	Educational programs in agriculture should include international perspectives.	153	4.29	.58
07	Educational programs in agriculture should be offered to help farmers understand current international market trends.	153	4.28	.52
08	Educational programs in agriculture should offer some international perspectives.	153	4.22	.50
09	The U.S. should work towards more open markets with other countries.	153	4.12	.72
10	Educational programs in agriculture should compare agricultural production systems around the world to that of the U.S.	153	4.06	.59
11	Educational programs in agriculture should include international topics regarding agribusiness in other countries.	152	4.03	.53
12	International exchange programs will encourage farmers to learn about international agriculture.	153	3.94	.69
13	As a U.S. farmer, I feel that I have an obligation to improve my knowledge of other countries' agricultural systems.	151	3.92	.76

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*Scale: 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree

Table 01. (Continued)

Rank	Perception statement	n	Mean	SD
14	There are many business opportunities in agriculture in other countries.	151	3.89	.73
15	I would consider adopting new agricultural practices used by farmers in other countries.	153	3.84	.79
16	Educational programs in agriculture should be offered in order to understand problems that farmers face in other countries.	153	3.84	.64
17	There are many job opportunities in agriculture in other countries.	153	3.71	.77
18	I would consider traveling abroad as a participant in an international exchange program.	153	3.68	1.08
19	I would consider acting as a host to foreign visitors as a part of an exchange program.	153	3.48	1.00
20	If international concepts were incorporated into agricultural education, it would change the marketing and production practices in the U.S.	152	3.33	.77
21	The U.S. should protect farmers by restricting the importation of agricultural products from other countries.	152	3.18	1.12
22	Even if agricultural training was offered related to international agriculture, agricultural practices will not change.	152	2.61	.79
23	U.S. farmers have no need for international knowledge and skills in agriculture.	153	1.57	.71
	Composite Mean Score for Perception Scale		3.85	

In summary, for the most part, nearly all the respondents perceived selected topic areas in international agriculture as "important".

Table 02. T-test results for respondents' perceptions regarding selected issues in international agriculture when leaders in the NYFEA were grouped by travel to a foreign country

Group	n	Mean	SD	t-value	df	prob.
Visit	66	3.85	.30	.55*	122	.033
No visit	74	3.42	.24			

*Significant at .05 level.

Conclusions and Recommendations

Based on the results of the study, the following conclusions can be made: (a) Leaders of the NYFEA who participate din this study seemed to indicate a general favorable agreement regarding the need for some form of a global outreach program in agriculture for young and/or adult farmers in the United States. (b) There was a general agreement regarding the importance and the need to expand awareness of the global community by adding international dimensions to the current educational programs in agriculture for young and adult farmers in the United States. (c) Most of the 34 selected topics related to international agriculture in the four broad areas (livestock production, crop production, horticulture, and general agriculture) were confirmed by the respondents to be "important". Marketing U.S. products overseas, crop pesticides used in other countries, new crop varieties from other countries, the impact of international livestock health issues on U.S. agriculture, and crop and livestock production management in other countries were the most important topics in international agriculture. (d) Leaders in the NYFEA who had spent some time in a foreign country tended to have more favorable perceptions about issues in international agriculture, respondents in this study agreed that international agriculture issues will become more important to the U.S. farmers in the next decade and that agricultural education needs to develop and maintain a commitment to the internationalization of its educational programs in agriculture for young and adult farmers in the U.S. (from opinion and comments section of the questionnaire). (e) Overall, leaders of the NYFEA felt that young and adult farmers needed to develop international agriculture attitudes and skills which would, therefore, enable them to compete and function more effectively in the international marketplace.

However, based on the findings and conclusions, the following recommendations were made: (1) Agricultural education departments should provide educational opportunities in international agriculture for NYFEA members, (2) Educational programs for young farmers should be delivered with a global perspective, (3) Educational programs for young farmers should be planned and/or revised to include most favorable international agriculture topics identified by the respondents, (4) Leaders of the NYFEA should maintain commitment to the internationalization of agriculture, (5) Leaders of the NYFEA should be more involved in international aspects to promote internationalization of agriculture and, (6) Spend some time in another country is recommended for leaders in the NYFEA through exchange programs.

Table 03. Means, standard deviations, and rankings regarding level of importance of topic areas in international agriculture as perceived by leaders in the NYFEA*

Rank	Topic area	n	Mean	SD
01	Marketing U.S. products in foreign countries.	152	4.48	.65
02	Impact of foreign pests and diseases on U.S. agriculture.	151	4.31	.77
03	Crop pesticides used in other countries.	152	4.13	.82
04	New crop varieties from other countries.	150	4.10	.80
05	Impact of international livestock health issues on U.S. agriculture.	151	4.05	.79
06	Chemical safety problems in other countries.	151	4.00	.84
07	Water quality issues in other countries.	149	3.95	.95
08	Marketing systems unique to other countries.	151	3.87	.81
09	Air quality issues in other countries.	150	3.87	.97
10	Governments regulations for farmers in other countries.	150	3.84	.94
11	Natural resources management in other countries.	149	3.83	.94
12	Governments programs for farmers in other	151	3.82	.97
13	Leadership in agriculture in other countries.	150	3.82	.94
14	Breeding and reproduction systems in other countries.	151	3.81	.76
15	Use of agricultural computer technology in other countries.	152	3.67	.92
16	Wildlife management programs in other countries.	150	3.63	1.11
17	Human relations in agriculture in other countries.	150	3.63	1.02
18	Livestock production management in other countries.	152	3.63	.78
19	Vegetable production problems in other regions of the world.	152	3.62	.90
20	Crop production management systems in other regions of the world.	150	3.61	.85
21	Feeds and feeding systems in other countries.	152	3.60	.81
22	Fruit production problems in other countries.	152	3.60	.88
23	Soil fertility problems in other countries.	151	3.58	.93

Table 03.(Continued)

Rank	Topic area	n	Mean	SD
24	Agricultural credit for farmers in other countries.	150	3.50	1.01
25	Decision making process used by farmers in other countries.	149	3.50	.98
26	Financial planning by farmers in other countries.	152	3.49	.95
27	Computer use by farmers in other countries.	150	3.42	1.02
28	Production records in other countries.	152	3.40	.86
29	Record keeping practices in other countries.	151	3.32	.90
30	Tax systems for farmers in other countries.	152	3.32	1.09
31	Land tenure systems used by farmers in other countries.	150	3.27	.92
32	Crop production records in developing countries.	151	3.25	.97
33	Landscaping problems in other countries.	151	2.96	1.01
34	Turf management problems in other countries.	152	2.91	1.02
	Composite Mean Score for Importance Scale		3.67	

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*Scale: 5 = very important, 4 = important, 3 = somewhat important, 2 = little importance, 1 = not important

Educational Implications

The results of this study may provide the basis for departments of agricultural education and the administrators in the NYFEA in planning to infuse international perspectives into their educational programs for young and adult farmers. It may also provide the basis for effective training of the agricultural educators and leaders in the NYFEA for this task. This study has special implications to agricultural education. The study found that participation in international activities, such as travel to a foreign country and/or hosting international visitors, had a significant impact on the leaders' perceptions regarding the internationalization of agriculture. Agricultural education was founded on the principle of experiential learning and that previous international experience has a positive influence on one's level of perception regarding international issues in agriculture. Therefore, agricultural education should take the initiative and responsibility to assist in developing educational programs in international agriculture and enhancing the international experience content in its activities throughout the learning process. Agricultural education as a discipline could enhance the learning environment in all other areas of agriculture, especially as it pertains to internationalization.

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Recent Graduates Perceptions Regarding the Infusion of a Global Perspective into the Curriculum of Selected Land-Grant University Colleges of Agriculture

by

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Introduction

It is generally agreed among leaders of the U.S. government, business, and other interests that we are in an age of unprecedented interrelationships with foreign governments and peoples. In particular, we have recently seen the development of an evolving international system of agriculture based upon a system of international trade (Schuh, 1985). Many also believe that with the development of this system comes the need for additional skills to conduct matters in a global setting. Therefore, for the U.S. to interact effectively we will need an education appropriate to develop these skills. Skolnikoff (1993), sums it up by noting:

> The research universities - with an important role in the training of future national leaders for the public and private sectors both in the United States and abroad - now have a central responsibility to prepare their students adequately for the global environment in which they will participate throughout their careers (p 226).

Internationalization of curriculum is justified in both social and economic terms (Bruce, 1991) and is supported by the literature. On the economic side, literature suggests that some companies are now moving towards preparing their personnel to meet the global challenge. . Evans (1989) considers human resources a key to success in international business. Some international businesses are beginning to recognize the need for training programs to develop personnel for overseas assignment (Tung, 1984). Therefore, a global perspective represents a set of skills which at least some employers are eager for their employees to possess.

In the social realm, world interaction has increased dramatically through communication and transportation technology. Challenges such as environmental degradation, ethnic conflict, and others require many nations to work together for long-term solutions. Lamy (1983) states, "Global perspectives education encourages students to find workable solutions to socioeconomic, military-security, and ecological problems which challenge the leaders and citizens of this world (p. 18)." Case, (1993) identified substantive and perceptual dimensions of a global perspective education. The substantive dimension promotes the knowledge of people, places, events, and issues beyond the local and immediate. The perceptual dimension encompasses values and attitudes that differentiate a broad minded perspective from a parochial perspective. Use of these dimensions will support students' abilities to rationally reflect and reach conclusions on issues of global importance.

There are a number of recent studies that assess the attitude of different segments of society toward international agriculture activities. Jones (1985) assessed the factors that motivate College of Agriculture faculty involvement in international development activities at five Midwest land grant universities. He found that mostly older more well-established faculty were involved in international development activities and recommended that younger faculty be encouraged to become involved and rewarded and recognized in conjunction with the involvement in international development activities. This is significant in that it points out a general failing of the university system in not rewarding international involvement in the promotion and tenure process. Disincentive for faculty involvement in international activities presents difficulty for faculty to provide a global perspective to students since the faculty has no experience themselves.

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King and Martin (1994) conducted a survey of College of Agriculture teaching faculty at Iowa State University in order to determine their perceptions on infusing a global perspective in the college of agriculture curriculum. However, while some teaching faculty were adding a global perspective to their instructional programs, a greater number were doing little. They also found that faculty who had international experience and spoke a foreign language tended to be more supportive of internationalizing the curriculum.

In a study of perceptions held by agribusiness persons in Iowa regarding the internationalization of education in agriculture, Wirth & Martin (1995) found that respondents favored the inclusion of international perspectives in educational programs. In particular, respondents felt that the areas of knowledge of world markets, marketing, and the need for more open markets was particularly important. Also considered important were crop and livestock diseases that may affect U.S. production.

Sammons (1995) surveyed Iowa State University undergraduates on a number of issues regarding the internationalization of the curriculum of the College of Agriculture. She found that students may not fully support the internationalization, particularly if more courses are required. If internationalization was undertaken by infusion of international content into existing courses, the response was more favorable. Students also indicated that most of the courses in the College of Agriculture had little or no international content. In addition, professors' efforts to infuse a global perspectives into the curriculum was inadequate. The methods used are mostly learner-passive and that a more experiential method would have greater affect. Students who participated in some form of international activity tended to agree with perception statements on the internationalization of the curriculum, although the number of students actually participating in these activities is quite low. Students identified a number of barriers to their participation in international activities including financial considerations, progress in their academic programs, and lack of information of available programs.

Purpose and Objectives

The development of properly trained graduates by land-grant colleges of agriculture to meet global challenges is essential. Recent graduates of colleges of agriculture represent an important element in this constituency which has not yet been studied. Therefore, the primary purpose of this study was to identify the perceptions held by recent graduates of selected land-grant university colleges of agriculture towards a global perspective in higher education in agriculture. The specific objectives included:

1. To identify selected demographic information of recent graduates of selected midwest land-grant colleges of agriculture.

2. To identify perceptions held by recent graduates regarding adding a global perspective to curricula of selected colleges of agriculture.

Methods and Data Sources

The descriptive method of research design was used for this study and required the use of quantitative statistical analysis. Former students of three midwest land-grant universities who graduated in Spring Semester, 1990, were selected as the population base for the study. These schools included Iowa State University, University of

Nebraska and the University of Missouri. The Alumni Association at each school supplied the researchers with names and contact information of the graduates. The study employed a mail questionnaire to collect data.

One section of the instrument was devoted to measuring former graduates of colleges of agriculture perceptions regarding adding a global perspective to the curriculum of colleges of agriculture. The perceptions were measured through employment of a five point Likert-type scale with descriptors of strongly disagree; disagree, neutral, agree, strongly agree. The final section of the instrument collected data on select demographic characteristics of the participants.

Quantitative data was compiled and coded and then analyzed using the statistical package for the social sciences (SPSS). All analyses were conducted at the Department of Agricultural Education and Studies computer laboratory. Data was analyzed to meet the objectives of the study. The procedures used to analyze the data included:

1. Frequencies, percentages, means and standard deviations were computed for all instrument items.

2. The Cronbach alpha process was used for reliability testing.

3. Analysis of Variance was used to determine if significant differences existed based on demographic information.

Results

Cronbach's alpha was utilized to determine the reliability of the grouped items in the instrument. For Part A, " Views on Adding a Global Perspective to Colleges of Agriculture", the alpha coefficient was found to be .84. A Cronbach's alpha score of greater than .80 is considered high, particularly for the behavioral measure such as Part A (Hopkins, Glass and Hopkins, 1987).

Demographic Characteristics

This section provides a description of the 154 respondents based upon demographic characteristics. More than 76 percent (n=118) of the respondents were male and nearly 23 percent (n=35) were female. One respondent (.6%) did not respond to the gender item. Most respondents were between the age of 20 and 29, making up 64 percent (n=99) of the respondents. Slightly more than 25 percent (n=39) were between 30 and 39 years old. And 9 percent (n=14) were between the ages of 40 and 49. One respondent (.6%) was between 60 and 69 and one response (.6%) was missing. When asked if they were U.S. citizens, 94.2 percent (n=145) responded yes while 5.8% (n=9) responded they were not citizens of the U.S. Of the respondents, 124 (80.5%) spoke one language, 22 (14.3%) spoke two languages, 5 (3.2%) spoke three languages and 3 (1.9%) spoke 4 or more languages. Over half of the respondents (51.3%, n=79) reported they worked for businesses. Twenty-five percent (n=39) worked for an educational institution i.e. a local school, college or university. Other organizations reported as employers were local, state or federal government (12.3%, n=19); farms (4.5%, n=7); non profit organizations (3.9%, n=6). Over one-third (n=52) responded that they had never left the U.S. and 37.7 percent (n=58) said they had been outside of the country for less than one month. Twenty-two ((14.3%) had been out of the country for 1 to 6 months. Slightly more than 10 percent (n=16) had been outside of the U.S. for more than 2 years. A majority of the graduates (68.8%)

reported that the organizations they worked for conducted some type of international activity. In addition nearly half of the respondents (45.5) reported that they were involved in some sort of international activity in their jobs.

Student Perceptions Regarding Adding a Global Perspective to Colleges Of Agriculture

A five point, Likert-type scale was used to measure graduates perceptions regarding adding a global perspective to the curriculum of Colleges of Agriculture. It was established *a priori* that a mean rating of 3.50 or higher indicated agreement with a perception statement while a response of 2.50 or lower indicated disagreement

The perception statement with the highest mean score (mean = 4.10) was "Experiences in other countries will change attitudes of students toward other countries". Other perception statements that received high mean scores were: "The college of agriculture should provide students with a greater awareness of international issues in agriculture" (mean = 4.04), "The curriculum of the college of agriculture should reflect a respect and knowledge of the global community (mean = 4.00), "It is important that college of agriculture graduates have an understanding of agricultural systems of other countries" (mean = 3.88), "I would encourage undergraduate students in colleges of agriculture to take part in international opportunity programs" (mean = 3.85), "Increasing awareness of the U.S. involvement in international agriculture is an important goal of the college of agriculture curricula" (mean = 3.77), "The college of agriculture should encourage students to participate in international internship programs" (mean = 3.66), "College of agriculture students need a background of international knowledge in order to develop skills and practices that are more compatible to a global perspective" (mean = 3.64), "The college of agriculture should offer more international experiences for students (mean = 3.63), "Global perspective education will improve job opportunities for college of agriculture graduates" (mean = 3.60), "Increasing students' awareness and skills in dealing with a global environment will help graduates gain employment" (mean = 3.578), "It is a good idea for college of agriculture undergraduates to take part in an international experience program" (mean = 3.53), and "Having a global perspective will enhance a graduate's ability to solve problems in his/her work" (mean = 3.50).

Perception statements that respondents showed a high level of disagreement with were: "College of agriculture students should not be exposed to alternative viewpoints" (mean = 1.70), "When I was an undergraduate in the college of agriculture, I was involved in international activities" (mean = 2.13), "There is no need to assist students to develop a global perspective in agriculture since this is provided elsewhere in the university" (mean = 2.21), "College of agriculture students need to have completed an international experience before graduation" (mean = 2.27), and "College of agriculture curricula should promote the United States perspective rather than help students develop skills and practices that would be compatible on a global scale" (mean = 2.30).

Analysis of Variance

Respondents were grouped using demographic data according to the following variables: age, gender, year of last degree, university of last degree, highest degree, department, citizenship, languages spoken, length of time spent outside the U.S., type of organization worked for, organization involved in international activities, job title, years worked for organization, and whether personally involved in international activities. The group data were then compared composite mean score (M=3.47) for the perception scale. The level of significance for all tests was set *a priori* at .05.

Analysis of variance indicated a significant difference among respondents when grouped by age and analyzed with e perception variables (Table 1). A post hoc multiple comparison test was performed to determine whether differences between pairs of means was the reason for the significant F-ratio. Pair-wise comparisons were made using the Tukey Method or HSD (honestly significant difference). The error rate was maintained at the previously established level of .05. Respondents in the age group of 40 to 49 years old (M=3.93) were significantly different from those in the age group 20 to 29 (M=3.35) when analyzed with their perceptions regarding adding a global perspective to curriculum of colleges of agriculture. It can be concluded that 40 to 49 year olds tended to agree more than 20 to 29 year olds with the perception statements regarding adding a global perspective to curriculum of colleges of agriculture.

Table 1
Analysis of variance regarding perceptions on adding a global perspective to curriculum of colleges of agriculture by age of recent graduates of selected colleges of agriculture (N=154)

Age	n	Mean	F-ratio
20 - 29 (a)	98	3.35	
30 - 39	35	3.60	
40 - 49 (a)	14	3.93	
50 - 59	0	0.00	
60 - 69	1	3.75	5.91*

* p < .05.
(a) denotes pairs of groups significantly different at the .05 level.

Analysis of variance indicated a significant difference among respondents when grouped by highest degree obtained and analyzed with the perception scale (Table 2). The Tukey analysis indicated that a significant difference exists that respondents with the Ph.D. degree (M=3.82) were significantly different from those with a B.S/B.A. degree (M=3.39). Therefore, it can be concluded that respondents with a doctorate degree tended to agree more with perceptions statements about adding a global perspective to college of agriculture curriculum that those with bachelor's degrees.

Table 2
Analysis of variance regarding perceptions on adding a global perspective to curriculum of colleges of agriculture by highest degree obtained of recent graduates of selected colleges of agriculture (N=154)

Degree	n	Mean	F-ratio
B.S./B.A.(a)	97	3.39	
M.S./M.A.	26	3.52	
Ph.D.(a)	21	3.82	
DVM	3	3.56	4.10*

* p < .05.
(a) denotes pairs of groups significantly different at the .05 level.

T-test results indicated a significant difference among respondents when grouped by citizenship (Table 3). United States citizens perception mean rating score was 3.44 while respondents with citizenship in another country had a score of 3.99. Therefore, it can be concluded that respondents with citizenship in a country other than the United States tended to agree more with perception statements regarding adding a global perspective to curriculum of colleges of agriculture.

Table 3
Citizenship differences in perceptions regarding adding a global perspective to college of agriculture curriculum as reported by former students of selected universities (N=154)

Group	n	Mean	SD	t-value
U.S. citizens	141	3.44	.555	
Not U.S. citizens	8	3.99	.299	-2.79*

* p <.05, two-tailed.

Analysis of variance indicated a significant difference among respondents when grouped by number of languages spoken and analyzed with the perspective variables (Table 4). The Tukey method found that respondents who speak two languages (M=3.76) were found to be significantly different from those who speak one language (M=3.38). From this it can be concluded that those who speak two languages tended to agree more than those who speak just one language with the perception statements about adding a global perspective to curriculum in colleges of agriculture.

Table 4
Analysis of variance regarding perceptions on adding a global perspective to curriculum of colleges of agriculture by number of languages spoken by recent graduates of selected colleges of agriculture (N=154)

Number of Languages Spoken	n	Mean	F-ratio
One(a)	120	3.38	
Two(a)	21	3.76	
Three	5	3.95	
Four or more	3	3.94	5.28*

* p < .05.
(a) denotes pairs of groups significantly different at the .05 level.

Analysis of variance indicated a significant difference among respondents when grouped by the amount of time spent outside the United States and analyzed with the data from the perception scale (Table 5). Based on the finding of the Tukey procedure, respondents who spent one to six months (M=3.77), more than two years (M=3.95), and one year to two years (M=4.27) outside the United States differed significantly from those that have spent no time outside the U.S. (M=3.20). In addition, respondents who have spent more than two years outside the United States (M=3.95) were significantly different from those that spent less than one month outside the U.S. (M=3.41). It can be concluded that respondents who have spent greater amounts of time outside the United States tended to agree more with the perceptions statements about adding a global perspective to curriculum of colleges of agriculture than those that have spend little or no time outside the United States.

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Table 5
Analysis of variance regarding perceptions on adding a global perspective to curriculum of colleges of agriculture by time spent outside of the United States(N=154)

Time	**n**	**Mean**	**F-ratio**
None(a,b,c)	51	3.2	
Less than one month(d)	56	3.41	
One month to six months(a)	22	3.78	
Seven months to one year	3	3.73	
One year to two years(b)	2	4.27	
More than two years(c,d)	15	3.95	8.78*

* $p < .05$.
(a,b,c,d) denotes pairs of groups significantly different at the .05 level.

T-test results indicated a significant difference in perceptions among respondents who worked for organizations that conduct international activities and those that do not (Table 6). The perception mean rating for respondents who had worked for an organization that conducted international activities was 3.62 and for those who did not, 3.08. It can be concluded that respondents who worked for organizations that conduct international activities tend to agree more with the perception statements than those who did not.

Table 6
Differences of whether respondents organizations conduct international activities in perceptions regarding adding a global perspective to college of agriculture curriculum as reported by former students of selected universities (N=154)

Group	**n**	**Mean**	**SD**	**t-value**
Conduct international activities	66	3.69	.483	
Do not concuct international activities	77	3.29	.543	4.57*

* $p <.05$, two-tailed.

T-test results indicated a significant difference among respondents who were involved in international activities in their job and those who were not (Table 7). The perception mean rating for respondents who were involved in international activities in their job was 3.69 and 3.29 for those who were not. It can be concluded that respondents who are involved in international activities in their jobs tended to agree more with perception statements regarding adding a global perspective to curriculum than those who did not.

Table 7
Differences of whether respondents are involved in international activities in their job in perceptions regarding adding a global perspective to college of agriculture curriculum as reported by former students of selected universities (N=154)

Group	n	Mean	SD	t-value
Involved in International activities	66	3.69	.483	
Not involved in international activites	77	3.29	.543	4.57*

*p <.05, two-tailed.

Conclusions

Analysis of the data indicated that students held generally positive attitudes towards perception statements regarding adding a global perspective to curriculum of colleges of agriculture. Demographic information indicated that nearly 70 percent of the respondents worked for an organization that conducted some type of international activity. In addition, over 45 percent of the respondents stated they were involved in some type of international activity in their work.

Not surprisingly, only 19.4 percent of the respondents spoke more than one language. When you consider that 5.8 percent of respondents were not U.S. citizens and were likely to speak English as a second language and therefore likely part of the 19.4 percent who speak more than one language, the number of U.S. citizens who speak more than one language is likely considerably less than 19.4 percent. And this does not take into account those respondents who are naturalized citizens who likely speak more than one language which would lower the percentage even further for native born Americans.

Also, 33.8 percent of respondents have never been outside the United States and 37.7 percent have been outside the United States for less than one month. Therefore, a total of 71.5 percent of respondents have either not been out of the United States at all or for less than one month.

A large majority of respondents (68.8 percent) reported that the organizations they worked for conduct some type of international activity. And 45.5 percent reported that they were involved in some sort of international activity in their jobs. This is in sharp contrast with the above mentioned data. So while over two thirds of the respondents work for an organization that conducts international activities and nearly half are personally involved in those activities, less than one quarter of respondents speak more than one language and over nearly three quarters have been outside the U.S. for less than one month, if at all. This suggests that the respondents do not posses some of the skills and experiences which match the needs of their employers.

Those respondents who spoke two languages had a higher level of agreement with the perception statements than those who spoke only one language. Generally, it can also be said that those who have spent greater amounts of time outside the United States tended to agree more with the perception statements than those who have spent little or no time. This is in line with the findings of King (1994) and Sammons (1995) and add further credence to the notion that number of languages spoken and time spent outside the United States are critical factors to ones view of a global perspective in college of agriculture curriculum. Similarly, respondents who worked for organizations that conduct international activities and those who were involved in international activities in their job were also likely to have a higher agreement with the perception statements than those who did not work for an organization with international activities or those who were involved in international activities in their job.

Implications

The results of this study indicate that like other groups, former students had a favorable attitude towards adding a global perspective to curriculum of Colleges of Agriculture. The study also indicates that despite the fact that most graduates work for organizations that conduct international activities and that many are involved in international activities themselves, they are still relatively poorly prepared to be effective in international activities. The findings indicate a clear need for increasing global perspectives education in colleges of agriculture of land-grant universities.

To do this, Colleges of Agriculture must institute programs and plans that will facilitate adding a global perspective to the curriculum. Globalization must take place in all three primary functions of the land-grant university. In particular, a global perspective education must be added to College of Agriculture curriculum. It is clear that most groups do not consider adding an international course requirement as sufficient (King, 1994, Sammons, 1995). Rather, international content must be infused into courses across the college. This will often require faculty to both understand the need for the international content and gain the necessary international experience to bring it about.

Infusing a global perspective education in curriculum will undoubtedly generate increased interest in international exchanges and experience programs. So, more and higher quality international experience opportunities must be available for students to gain first hand exposure to the world. It is through the combination of a global perspective in curriculum and the opportunity for students to gain meaningful international experience that students will truly be prepared to succeed in the global environment in which they will live and work.

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Session H Extension Programming
Session Chair - Roger Steele
Kennedy Room

TITLE:	Testing Decision-Making Tools to Help Front-Line Agricultural Extension Staff Advise Ghanaian Farmers on Effective Maize Storage Options
AUTHORS:	Rose Feakpi, Ministry of Food and Agriculture, Ghana Moses Zinnah, University of Cape Coast, Ghana ,Ivy Drafor, University of Cape Coast, Ghana Julia Compton, Nairobi, Kenya *DISCUSSANT:* Don Meaders
TITLE:	Andragogy Versus Pedagogy Revisited: Extension Risk Management Education in the Post-Pair Act Environment
AUTHOR:	Henry Bahn, USDA - CSREES *DISCUSSANT:* Bill Seiders
TITLE:	A Case Study in Collaborative Consultation
AUTHOR:	Arlen W. Etling, The Pennsylvania State University *DISCUSSANT:* Don Meaders
TITLE:	The Image of Michigan State University Extension As Perceived by County Advisory Committee Members and Extension Staff In Michigan
AUTHORS:	Frank Bobbitt, Usman Adamu Michigan State University *DISCUSSANT:* Don Meaders

TESTING DECISION-MAKING TOOLS TO HELP FRONT-LINE AGRICULTURAL EXTENSION STAFF ADVISE GHANAIAN FARMERS ON EFFECTIVE MAIZE STORAGE OPTIONS[1]

By

Rose Feakpi[2], Moses Zinnah[3], Ivy Drafor[4] and Julia Compton[5]

Introduction

According to the Ghana Statistical Service (1995) maize is the most important gain crop in Ghana. However, most farmers experience very high storage losses, with estimates reported at between 30-40%. One of the recent factors contributing to high storage losses currently being experienced by Ghanaian farmers is the outbreak of a new and destructive pest of stored maize, the Larger Grain Borer (LGB) Prostephanus truncatus (Hon). It is believed that the new pest entered the Volta Region of Ghana from neighboring Togo.

The LGB can turn the maize grains into powder, causing high losses to farmers and threatening their food supply and income. Preliminary results of a draft model to predict the possible impact of LGB in Ghana indicate that if no action is taken to curb the outbreak of the pest, it could cause losses in maize of up to 30 billion cedis (about US$17 million) (Boxall, 1995).

The Purpose of This Paper

The purpose of this paper is to show how Decision Tree is being effectively used to elicit information from farmers about their decision-making criteria for selecting the best option(s) for controlling their stored maize from the LGB.

The dominant communication approach which extension staff in Ghana follow is the linear model of communication. Researchers act as the main source of "good" technologies, extension staff act as conduit for the transfer of

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technologies from researchers to farmers who in turn are supposed to use the recommended technologies. Most of the current extension staff in Ghana have not received training in participatory extension approaches, such as the Decision Tree, to enable them to give farmers several options from which they could make the most appropriate choice in the midst of very high risks and uncertainty.

Until recently, extension staff in Ghana were not trained to be facilitators, but merely technology deliveries. Thus, most extension staff who are currently in the field do not make provision for eliciting farmers' ideas about the development and adoption or adaptation of new agricultural technologies. In cases where researchers and extension staff involve farmers at all, the farmers are only expected to follow directives from researchers and extension staff; farmers play a passive role. As a result of the above, recommendations from researchers and extension staff are often not appropriate to most farmers' situations.

The Volta Region of Ghana is the area where the LGB is most severe. A bilateral British-Ghana Project, under the auspices of the Oversees Development Administration (ODA), was launched in 1992 to work with farmers on the development, selection and use of a series of options for controlling the LGB. The LGB Project is researching, in close collaboration with farmers and extension staff, into several possible ways of controlling the new destructive pest, including improved storage methods. The focus of the LGB Project is to help farmers to select the most viable options from multiple recommendations, keeping in view their financial, technical and socio-cultural situations.

Brief Literature Review on the Use of Decision Tree

Farmers' decision-making process is the key to the adoption of agricultural innovations. This means agricultural extension staff and other development workers who seek to help farmers must have a thorough understanding of this decision-making process. An understanding of farmers' decision-making process enables extension staff to help farmers achieve their goals more satisfactorily. However, as van den Ban & Hawkins (1988:92) note, making a choice is difficult because we are usually uncertain about what the outcome will be. In the decision-making process we use information (knowledge) to reduce this uncertainty. Therefore, choice and knowledge must be examined alternatively.

According to Compton (1994), the Decision Tree, which graphically or schematically shows the decision-making process of farmers, is a useful way of: (1) capturing the current state of knowledge; (2) distinguishing pieces of information essential for making decision from those which are merely interesting, and (3) pointing out gaps in knowledge. Gladwin (1979; 1989) also provides empirical results to show that the Decision Tree can be used as an advisory tool to elicit information from individuals about their decision-making criteria on choices of recommendations, and to find out why a particular individual or group of people acts in a certain way. Making specific reference to pest management, Mumford and Norton (1984), opine that when research and extension programs in pest control are being developed, it is important that an early attempt is made to obtain information on farmer perceptions on the constraints affecting certain options and on farmers' objectives.

From the brief review of the literature, it is apparent that decision-making is a very subjective and personal process. It involves a careful thought process. Therefore, when eliciting information about the decision making process of an individual or a group of people, it is important to recognize the unique context and the larger system within which specific choices are being made.

Methodology and Data Source

This study was carried out from January to November 1995 in eight villages in the Volta Region. The villages were drawn from four of the five agro-ecological zones. The fifth zone was not included in the study because LGB was not a serious problem there at the time the study was being conducted. Selection of the villages was purposive and was based on the following criteria: (1) the incidence of LGB in the area, (2) the importance of maize growing and storage in the area, and (3) representation of the major agro-ecological zones in the region. The study was carried out in consultation with LGB Project staff, extension staff of the Ministry of Agriculture in the area, farmers, and traders who sell maize. It was a learning process approach involving key stakeholders in the farming system in the study area.

Individual interviews, focus group discussions (with maize traders, farmers and extension staff), and group meetings with farmers and other key informants were used for data collection. The Decision Tree was tested on 102 randomly selected maize farmers, then modified and tested with 20 front-line agricultural extension staff working with farmers in the area. The Decision Tree participatory approach enabled extension staff to understand how farmers viewed risk and probabilities in a problem situation involving uncertainty, and the courses of action that might be undertaken. The use of multiple sources of information was influenced by the authors' philosophy that other people have rich knowledge, and that knowledge and ideas from different sources help to ascertain facts.

Results of the Use of Decision Tree Tools to Elicit Information from Ghanaian Farmers on Effective Maize Storage Options

Out of the total of 102 farmers surveyed, 55% were men while 45% were women. The majority (71.5%) of them were between the ages of 31-50. With respect to how they usually handle and use their harvested maize, 61%, 18.7% and 20.3%, of the respondents indicated that they store their maize for both sale and food, for sale only, and for food only, respectively. Regarding the farmers' experience with LGB infestation of their stored maize, 28% indicated that they had experienced LGB in the previous years.

Decision Tree #1: How do I Store My Maize? Figure 1 represents the Decision Tree of the farmers' responses to this question. Among the 88

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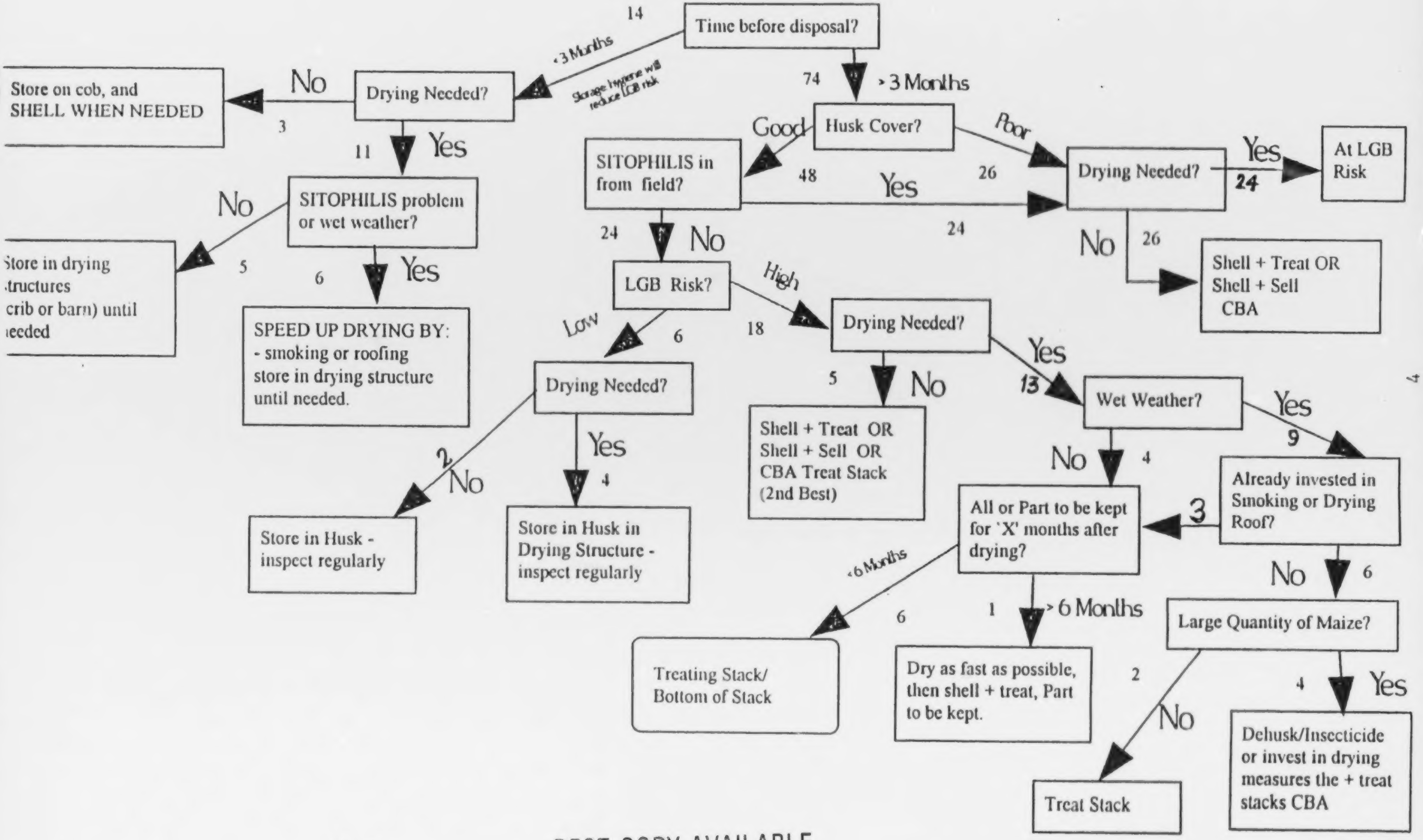
Figure 1, Decision Tree 1

"HOW DO I STORE MY MAIZE?"


Time before disposal?
14
<3 Months
Storage hygiene will reduce LGB risk
74
>3 Months
Drying Needed?
No
3
Store on cob, and SHELL WHEN NEEDED
11
Yes
SITOPHILIS problem or wet weather?
No
5
Store in drying
tructures
crib or barn) until
eeded
6
Yes
SPEED UP DRYING BY: - smoking or roofing store in drying structure until needed.
Husk Cover?
Good
SITOPHILIS in from field?
48
Yes
24
24
No
LGB Risk?
Low
6
Drying Needed?
2
No
Store in Husk - inspect regularly
Yes
4
Store in Husk in Drying Structure - inspect regularly
High
18
Drying Needed?
5
No
Shell + Treat OR Shell + Sell OR CBA Treat Stack (2nd Best)
Yes
13
Wet Weather?
No
4
All or Part to be kept for 'X' months after drying?
<6 Months
6
Treating Stack/ Bottom of Stack
1
>6 Months
Dry as fast as possible, then shell + treat, Part to be kept.
Yes
9
Already invested in Smoking or Drying Roof?
3
No
6
Large Quantity of Maize?
2
No
Treat Stack
4
Yes
Dehusk/Insecticide or invest in drying measures the + treat stacks CBA
Poor
26
Drying Needed?
Yes
24
At LGB Risk
No
26
Shell + Treat OR Shell + Sell CBA

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respondents who usually store their maize, 86.3% indicated that they usually store their maize in the husk for more than three months, while 13.7 percent store their maize for less than three months on the cob. Unobtrusive observations made during the study indicated that farmers traditionally store their maize in the husk, hence the high rate of its choice as a maize storage option.

The rest of respondents (13.7%) indicated that they do not store their maize after harvest. They gave the following reasons for their action: (1) there is usually good price for the early harvested maize, (2) I sell to defray debt, (3) I need money for preparing new farm plots, and (4) fear of envy from other farmers who may not get good harvests.

Decision Tree #2: My Maize Store is Infested - What Shall I do? (Figure 2). The farmers' decision-making process for the control of LGB was compared with the LGB Project's Decision Tree recommendations (Figure 3). As Decision Tree #2 in Figure 2 indicates, out of the total of 66 farmers who responded, the majority of them (47 farmers or 71.2%) usually take action when they observe LGB or other insect infestation in their maize. However, only 26 farmers (55%) followed the recommended practice of shelling and treating with chemical. Twenty-one respondents (44.6%) who did not follow the recommended practice gave the following reasons for their action: (1) economic - need cash for clearing a new maize plot, (2) unexpectedly high price for maize, (3) no chemical in the village, (4) social - fear of the effects of chemical on maize for family food, (5) emergency - maize used for funeral and other emergencies.

Based upon the reasons given by farmers who did not adopt the "shell and treat" option, it is apparent that this recommendation alone is not suitable to all maize farmers, even though more than half of the farmers (55%) had adopted the practice. It means that farmers must be give other options.

It is important to point out that the respondents who feared the effects of the use of chemicals in storing their maize were all women. This is a serious issue for food security in Ghana since it is estimated that women account for about 90% of the food processors in the country. If women, who make up a very large proportion of food processors, are not willing to use chemicals to store large quantities of food crops, then Ghana's food security is at risk. Women farmers may not be willing to store very large quantities of maize using chemicals in case of an unexpected severe outbreak of LGB in Ghana. This means that more women farmers should be reached by extension services in order to explain to them the need for appropriate and timely use of chemicals for maize storage, and to convince them about the safety of these recommended chemicals on food crops, including maize.

Figure 4 is the LGB Project's recommended Decision Tree regarding the question: I Want to Shell and Treat My Maize - Which Chemical Shall I Use? The Decision Tree for this question shows that the suitable option available to farmers for treating their maize was the use of a recommended chemical called "Actellic Super" because the sample villages were ranked among the high LGB risk areas.

Fig. 2, Decision Tree 2: FARMERS' DECISION COMPARED WITH LGB PROJECT'S DECISION TREE RECOMMENDATIONS
(Results from testing in 8 villages in the Volta Region)

DECISION TREE TESTED: "MY MAIZE IS INFESTED - WHAT SHALL I DO?"

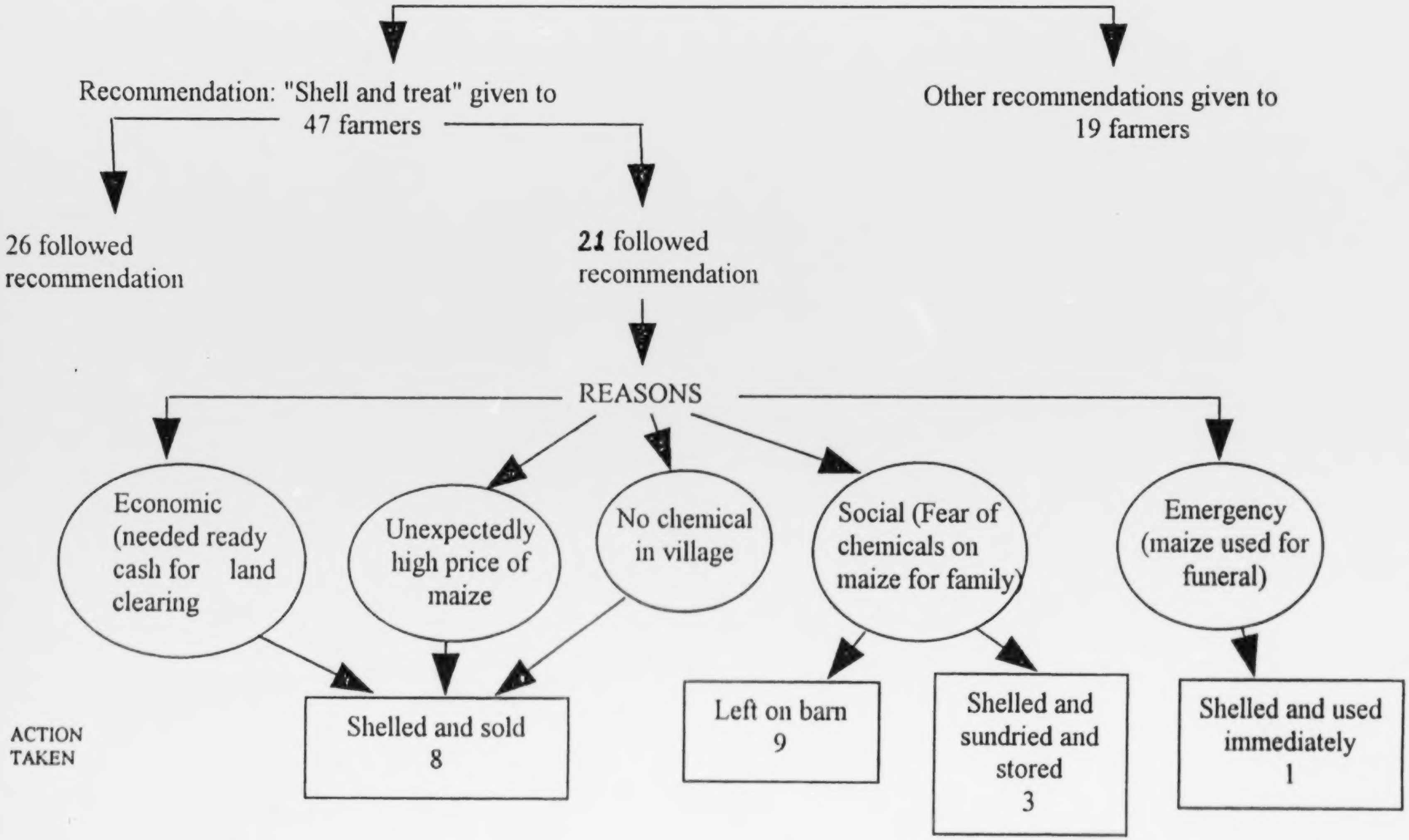

Recommendation: "Shell and treat" given to 47 farmers
Other recommendations given to 19 farmers
26 followed recommendation
21 followed recommendation
REASONS
Economic (needed ready cash for land clearing
Unexpectedly high price of maize
No chemical in village
Social (Fear of chemicals on maize for family)
Emergency (maize used for funeral)
ACTION TAKEN
Shelled and sold 8
Left on barn 9
Shelled and sundried and stored 3
Shelled and used immediately 1

Fig. 3: LGB PROJECT'S RECOMMENDED DECISION TREE ON THE QUESTION: "MY STORE IS INFESTED - WHAT SHALL I DO?"

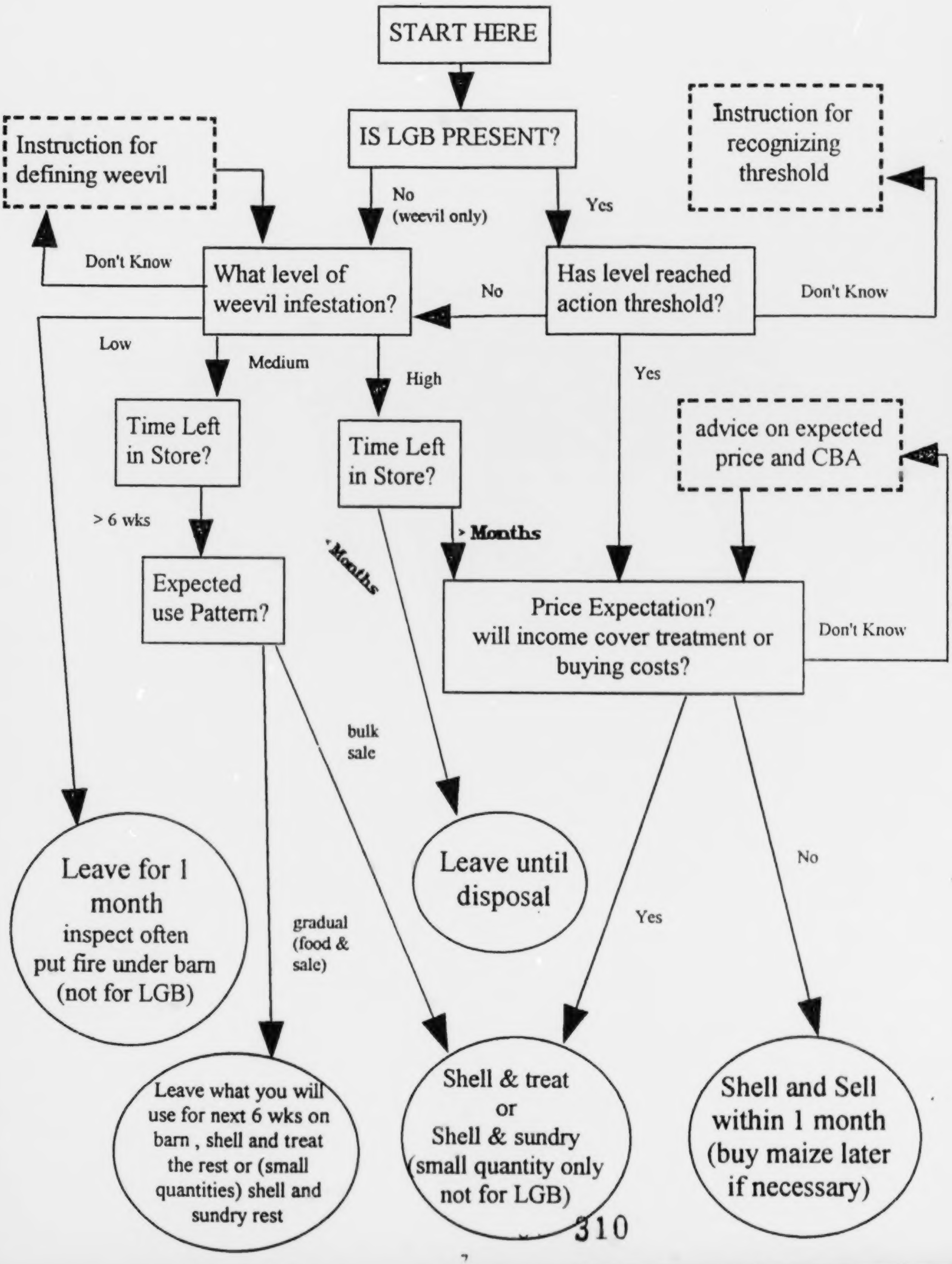
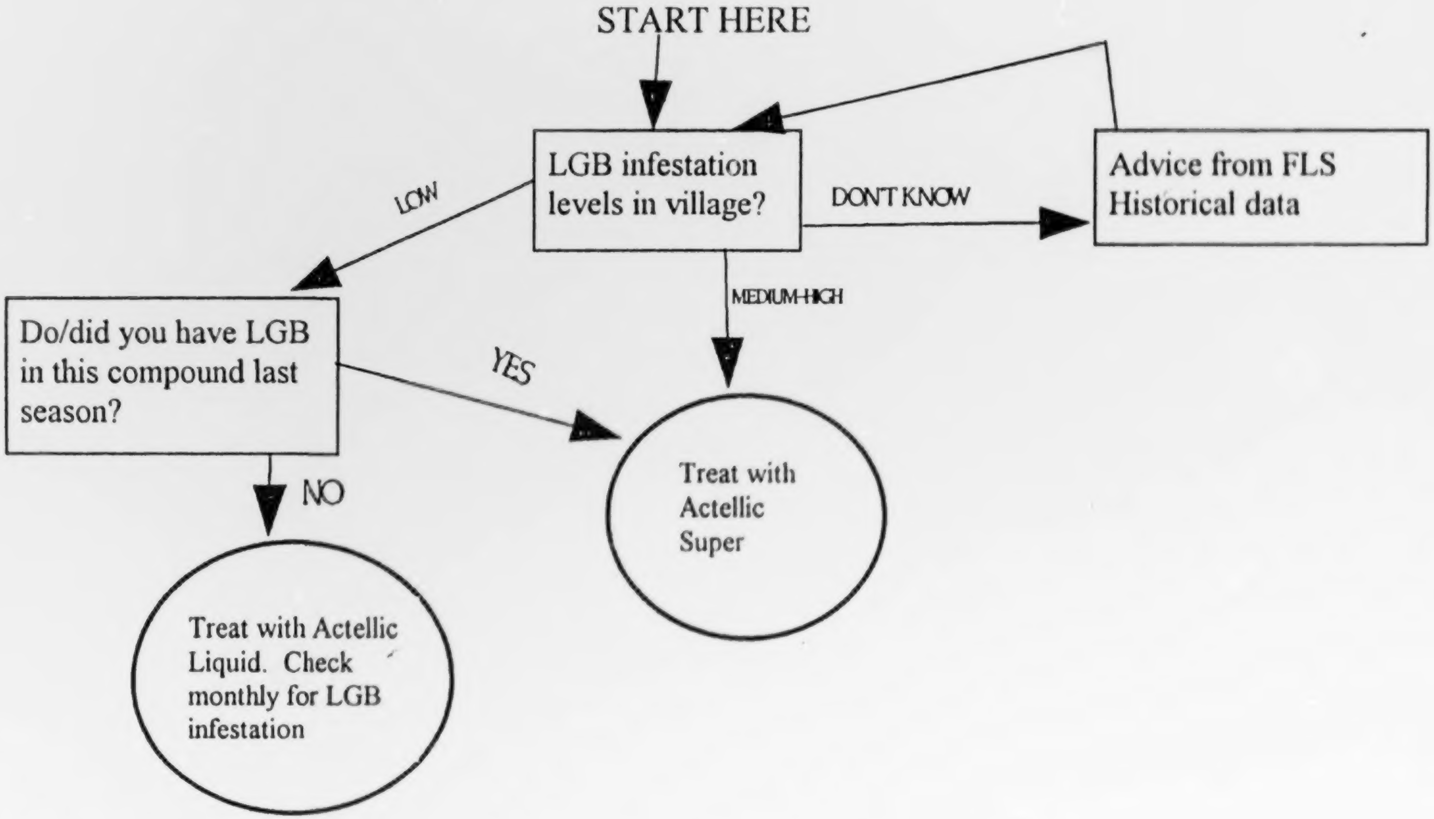

START HERE
IS LGB PRESENT?
No (weevil only)
Yes
Instruction for defining weevil
Instruction for recognizing threshold
Don't Know
What level of weevil infestation?
No
Has level reached action threshold?
Don't Know
Low
Medium
High
Yes
Time Left in Store?
Time Left in Store?
advice on expected price and CBA
> 6 wks
< Months
> Months
Expected use Pattern?
Price Expectation? will income cover treatment or buying costs?
Don't Know
bulk sale
Leave for 1 month inspect often put fire under barn (not for LGB)
Leave until disposal
gradual (food & sale)
Yes
No
Leave what you will use for next 6 wks on barn , shell and treat the rest or (small quantities) shell and sundry rest
Shell & treat or Shell & sundry (small quantity only not for LGB)
Shell and Sell within 1 month (buy maize later if necessary)

Figure 4: LGB PROJECT'S RECOMMENDED DECISION TREE ON THE QUESTION:

"I WANT TO SHELL AND TREAT MY MAIZE: WHAT CHEMICAL SHALL I USE?"


START HERE
LGB infestation levels in village?
DON'T KNOW
Advice from FLS Historical data
LOW
MEDIUM-HIGH
Do/did you have LGB in this compound last season?
YES
NO
Treat with Actellic Super
Treat with Actellic Liquid. Check monthly for LGB infestation

OR Treat with A. Super if more available/convenient.

The experience from the use of the Decision Tree tools indicates that it is effective in eliciting information from individual farmers regarding the criteria they use for the selection of specific appropriate recommendations. This exercise has also shown that there is no hard and fast rule about the sequence of questions for administering the questions and modeling a Decision Tree. The questions for developing the Decision Tree only serve as a guide to the investigator, and help him/her to be mindful of the relevant issues to consider with regards to understanding farmers' decision-making process regarding the adoption or non-adoption of specific recommendations.

Farmers' perceptions and the criteria they use for judging maize storage losses (or other recommendations) must be considered within their unique context and social system. For example, the LGB Project defines maize damage threshold as the observed level of damage in the outer wall of the barn caused by LGB at which the farmer decides to take any control measure to prevent any further losses. According to the LGB Project's recommendation, three damaged cobs out of every hundred cobs seen outside the barn should serve as the threshold - a point when the barn should be brought down within one month. In this study, however, farmers perceived maize damage threshold differently: In Penyi village where maize is a staple food and is removed from the barn regularly, farmers examine the maize while dehusking and shelling and determine their own damage threshold. In contrast, at Dzolokpuita and Dzogbekope villages where maize is not removed regularly from the barn, the damage thresholds are determined by listening to the noise of insects in the stack, and looking for powder on the cobs.

Two specific cases may further explain how the issue of threshold varies, particular in terms of the use of the maize. Ernest, a maize farmer, determines his damage threshold level by the amount of shelled maize he gets from shelling one row of his maize stack. When one row of the maize stack gives him less than the normal five bowls of shelled maize, then he decides that he has a serious LGB problem and needs to shell. Ernest's neighbor, Joseph also looks at the damage threshold level in maize removed from the barn for consumption. When Joseph sees three damaged cobs in one lot (a lot is equivalent to three bowls of shelled maize (about 7.5 kilograms), then he feels that he has to shell.

An attempt was also made to find out whether females differed from their male counterparts in terms of the number of LGB damaged cobs they would accept as their threshold (a stage of damage when the farmer will no longer accept any insect damage and, therefore taking action to control or eliminate the insect). Three cobs out of hundred cobs (3%) was accepted as the threshold for the female group, while thirty cobs out of hundred cobs (30%) was accepted by the male group. This seems to confirm the general opinion of the LGB Project staff that the LGB (and other pests) problem has been of much concern to women than men. In addition, because women take care of food processing, preservation, storage, as well as food preparation in Ghana (and most Third World counties), they do not allow pest to destroy their maize.

The results, particularly in the cases mentioned above, suggest that in the short term, the LGB Project needs to develop several methods (options) for determining LGB and other insect damage thresholds, based on farmers' indigenous knowledge and the different storage methods and "threshold" criteria used by farmers. This may not be an easy task. The best long term solution is for the LGB Project to conduct further research with various types of farmers, based on the main uses of maize in order to arrive at a more suitable and relatively uniform method for determining LGB damage threshold for maize stored in barn.

Eighteen (90%) of the 20 front-line staff who tested the Decision Tree tool as an extension method indicated that the approach is: (1) participatory, (2) helpful in facilitating dialogue between farmers and extension staff, (3) helpful in bringing out issues (facts) from the farmers' point of view which are essential for adoption of innovations, and (4) helpful in identifying farmers' situation and come up with the more appropriate option(s). However, a few (10%) of the extension staff indicated that the Decision Tree has too many arrows, and thus difficult to use. This is an interesting finding because it reinforces the fact that many extension staff tend to view farmers' problems as simple, straightforward and unidirectional. However, in real life, farmers normally have complex and multifaceted problems which do not lend themselves to simple, short-cut answers.

Conclusion

The Decision Tree is an excellent toll for assisting farmers in informing extension staff of the specific choices they make and the rationale for those choices. However, the experience from this study indicates that the use of the Decision Tree is more effective with individual farmers rather than groups. The main reason is that the information generated from the Decision Tree is situation-specific and does not deal with diverse needs of group members. Farmers, even those within the same village, do not usually have the same needs or goals. Each farmer makes his/her decisions based on past experience and the unique context or environment within which he/she operates. As van den Ban & Hawkins (1988:91) succinctly point out, each farmer makes decisions based on probability estimates. Extension staff can, and should, play a useful role in helping farmers make their decisions on the basis of what they perceive as the most correct probability estimates.

The Decision Tree was, however, useful in group situations for: (1) creating awareness about a problem, such as the LGB, (2) generating discussion among group members in order to bring out their diverse views on the topic (recommended practice) and the options (3) discussing farmers' maize storage threshold levels as well as the recommended threshold, and (4) learning about farmers' indigenous technical knowledge which could help update the existing "scientific" knowledge on controlling LGB and other pest management practices.

Educational Importance

Choice, and the process of making that choice, is a critical issue in extension (adult) education. Farmers generally participate in extension programs on a voluntary basis with the aim of solving some immediate needs. But this is usually ignored by most extension staff in their work with farmers especially farmers who are illiterate and are erroneously perceived to be ignorant and unable to make the right choices for themselves. This calls for more understanding by agricultural extension practitioners of farmers' decision-making process in order to enable them to work more effectively with their clientele, individuals as well as groups. This paper adds information to the already existing knowledge regarding how the Decision Tree approach can be used as an effective tool for working with diverse individuals and groups (even illiterates) in capturing their current state of knowledge, distinguishing the pieces of information essential for decision-making and pointing out gaps in knowledge.

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Title: Andragogy Versus Pedagogy Revisited: Extension Risk Management Education in the Post-FAIR Act Environment

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Title. Andragogy Versus Pedagogy Revisited: Extension Risk Management Education in the Post-FAIR Act Environment

Introduction: Passage of the Federal Agricultural Improvement and Reform (FAIR) Act of 1996 dramatically alters the decision environment facing many U.S. farmers. "Freedom to Farm", a major selling point of the FAIR Act, removes some of the constraints that previous legislation placed on farmers choosing to participate in voluntary farm programs. Previous farm policy relied on extrinsic motivation - price supplements above market levels, storage payments, and others - to obtain long term income stability and supply management. While it may be argued that previous policy was successful in increasing farm income relative to the non-farm sector, chronic crop surpluses and high social costs ultimately made the previous farm programs both economically and politically unsustainable.

The most important component of the changes resulting from the FAIR Act is the termination of the positive extrinsic motivators (the decoupling of government payments from crop production and sales, and the gradual elimination of government transfer payments over a seven year period) and their replacement with personal responsibility in choosing production enterprises and marketing alternatives. These changes place a large group of traditional extension clientele in a new risk environment as the social "safety net" provided by agricultural legislation over the past sixty years is dismantled. Farmers will no longer be able to depend on deficiency payments, generous non-recourse commodity loans, and disaster payments to supplement their income in times of low prices or adverse growing conditions.

Instead, farmers will make their own decisions regarding what and when to plant, and when and how to market. In exchange for this flexibility, they will depend entirely on the market place for their revenue, and ultimately their financial survival. Decisions will be motivated by market-determined prices and price expectations. No longer will farmers enjoy supplemental payments (partly paid months before harvest), and they also lose the luxury of having a government-provided forecast of expected average national prices for their crops. Perhaps most importantly, exogenously induced behavior to defer decisions when faced with uncertainty (e.g., participating in the farm program, placing crops under regular loan, entering the farmer-owned-reserve, receiving subsidized storage payments, receiving below-market loans to build additional storage) is replaced with the need to make tactical decisions in anticipation of future conditions, and to manage market and price risk directly.

Paradoxically, "freedom to farm" may thus be viewed by some farmers as negative or restrictive, leading to resistance to change and thus to resistance to the learning required to accomplish change. Their resistance may be due to faulty or inappropriate informal knowledge, i.e. "The theory doesn't fit", "it's not real world", "I know what I want ", etc. Inappropriate use of perceived self knowledge may result in bias against learning or in outright resistance to learning if the learning task is imposed. Finally, learning resistance may be a function of social status and the desire to maintain autonomy. If relatedness is lacking, rejection, resistance or negative motivation to accept change, and the adaptative learning it demands, may result.

Purpose: The purpose of this paper is to explore the emerging challenges to extension educators in teaching avoidance behaviors (e.g. risk management) to audiences that may be negatively motivated to accept the changes forced on them by the adjusted farm policy. It is hypothesized that adult learners faced with negative external motivators need a stronger declarative knowledge base as a prerequisite to integrating conflicting intrinsic and extrinsic motivations change behavior. Farmers generally perceive themselves as "expert" at production related topics but they feel less certain about dealing with non-production topics like environmental issues, government policy and programs, and public perceptions about agriculture. Farmers also assign less importance to non-production topics, which may imply that declarative knowledge in these topics is lacking or less salient to them. Thus, even novice problem solving and decision making schema may be absent or undeveloped as farmers transition from government-provided risk management activities. Prior knowledge and self knowledge, strongly held convictions, egocentrism may conflict with new, threatening, or contradicting topics, and may hinder cognitive development.

The technology transfer model historically used by extension in rural adult education for farmers has grass roots appeal and a high degree of acceptability due to its focus on problem solving and practical application of knowledge. It places relatively low cognitive demands on the learner: the farmer needs to identify a problem (e.g., reduced yields due to insect or disease damage), comprehend the available body of valid interventions (e.g., chemical control methods), and apply the most appropriate method. These activities are consistent with the human information processing model, particularly the problem orientation, recalling ordered sets of interventions, and selecting those deemed relevant given the problem. The itinerant educator, armed with demonstration plots, generalizable research results, and decision rules, is well suited to deal with these needs. But the itinerant educator generally does not concentrate on the adaptive orientation of learners. In fact, the didactic paradigm of demonstration and transfer of knowledge and skills, and generalization that is common to production agricultural extension work may actually impede the introduction and development of new cognitive skills.

Strengths and weaknesses of existing and emerging adult education methods are explored, examples are presented, and suggestions for more effective agricultural extension education are made.

Methods: Adult earners who display low levels of domain expertise or those who are confronted with new information that contradicts existing views often have difficulty assimilating and accommodating new knowledge. Theories of intrinsic and extrinsic motivations of learners, Knowles' andragogical adult education model versus the the more rigid pedagogical model, and Bloom's taxonomy of cognitive domain are explored and compared relative to the emerging extension educational needs of adult audiences reacting to unsolicited, exogenous changes perceived as risky and detrimental to their welfare. The weaknesses and potential conflicts of the itinerant education and technology transfer models with emerging education needs are examined and compared with emerging educational needs.

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Results and Conclusions: While contemporary U.S. farmers indeed have more freedom to farm in the post-FAIR Act environment, by definition they also face more freedom to fail - from errors of omission as well as commission. Many of the contemporary farmers' risk management decisions will be played out in the market place. Identifying, managing, shifting, and controlling market and price related risks will be viewed as negative avoidance activities by some farmers, resulting in unwillingness to learn, and may thus result in reliance on obsolete self knowledge that is inappropriate or ineffective in the post-FAIR Act market environment.

Teaching topics of risk management to negatively motivated adults is deemed not to be compatible with the simple technology transfer model often employed in agricultural extension, as higher order cognitive skills (analysis, synthesis, and evaluation) are required to successfully meet the challenges of the future. A more rigorous, more pedagogically-oriented approach is called for.

Examples of some contemporary risk management extension education programs - both successes and failures - are presented and discussed.

Educational Importance: New farm policy reverses some sixty years of influence on American farmers, and revokes many of the positive exogenous motivators previously used to influence farmer behavior. This places new learning demands on them. To the extent that technology and information transfer, and thus the itinerant education model, are necessary but no longer sufficient means for providing this type of education, agricultural extension educators are faced with a dilemma of retooling to provide more intensive education designed to develop higher order cognitive skills in their agricultural clientele.

The educational demands resulting from the changes in agricultural policy may be perceived as threatening to extension disciplinary specialists if they view their role as "thinking on behalf of the clientele" and also to county agents who may be comfortable to functioning primarily as information and technology transfer facilitators. At the same time, these contemporary needs place unsolicited learning demands on agricultural extension clientele, calling for a more rigorous and intensive adult education approach.

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A Case Study in Collaborative Consultation

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Introduction

Sometimes the consulting job you accept is different from the job you encounter when you arrive on site. A variety of problems can occur in obtaining a clear description of the job to be done and the employer's expectations. Communication involving different languages and cultures can break down. Often other groups and individuals, who are affected but not consulted initially, have different opinions than your employer. Conditions may change after you agree to consult and before you arrive. Expectations of your employer can change.

Uncertainty was a dominant characteristic of the consultant assignment in this case study. What started as an invitation to present a weeklong workshop on strategic planning and teamwork changed dramatically. Without previous experience in collaborative consultation and a sound understanding of the workshop content the author might have been unable to adapt to the new situation and lead a successful workshop which satisfied the participants.

Background to the Assignment

The author had previously taught a course in "leadership for community development" at the University of Monterrey, Mexico (UDEM), during the spring semester of 1995. UDEM invited him back in April, 1996, to present a week-long intensive workshop on the same topic to a group of faculty and staff that had not taken the course. They indicated that the emphasis would be on "teamwork and program development." When he arrived in Monterrey the day before the workshop, however, he learned of a few new details: 1) the participants were the members of UDEM's three "non-academic" departments (physical education, extra-curricular music and drama, and community service); 2) the department head of physical education had just been fired; 3) a new position, division director, had just been created (and filled by the rector) to administer and unify these three previously independent departments; 4) the consultant was being brought in to meet with the faculty and staff (together for the first time) to help them "begin to work as a team" in this new administrative unit.

Purpose and Method

The new division director and the consultant agreed that the focus (purpose) of the workshop would be to help the group learn to work as a team which would include their input on their new division's plan of work. The difficulty in accomplishing this purpose was how to structure the workshop process and content so that participants would voluntarily accept and accomplish the purpose. The consultant was especially concerned about 1) the particular consultant role that he would use, 2) the leadership styles he would use, and 3) the choice and sequence of workshop activities.

The Consultant Role

Blake and Mouton's book, *Consultation* (1976) describes different approaches that a consultant can use. They describe five alternatives: 1) prescriptive, 2) theories and principles, 3) confrontation, 4) acceptance, and 5) catalytic (collaborative) consultation.

The last of these alternatives fits best when the consultant is trying to work with local leaders, empower them, and leave them competent so they are not dependent on the consultant. It works best for non-technical topics and it works best when the consultant assignment is changing due to dynamic field conditions which include uncertainty.

The new division director and the consutant agreed on a "collaborative" workshop emphasizing participation rather than prescription. They agreed to avoid the prescriptive, expert, confrontational, or acceptant roles described by Blake & Mouton.

Leadership

Most writing on leadership refers to three styles of leaders: directive, democratic, and non-directive (Hersey & Blanchard, 1972; Block, 1996 as two examples of many authors). These styles can be defined according to the following behaviors:

Directive	*Democratic*	*Non-Directive*
Initiates	Asks questions to involve others	Fades out gradually
Structures	Leads discussion	Uses silence
Motivates	Tests to see if Consensus Exists	Gives non-verbal support
Delegates	Encourages others to take responsibility	Refuses to make decisions for others
Praises		
Reprimands	Confirms commitments.	

Different situations require different styles of leadership. Evacuation of a burning building calls for directive leadership. Deciding among several suggestions for an organization's social event calls for democratic leadership. Helping qualified, experienced, enthusiastic committee heads calls for non-directive leadership.

Leadership will be most effective if a leader can look at a situation, decide what style of leadership is needed by the group, and act accordingly. When a leader is able to use each of the three leadership styles appropriately, this may be called **facilitator leadership** (Etling, 1975). A facilitator may therefore direct, use democratic leadership, or intentionally let the group provide its own leadership. The style used will vary according to the leader's formal role within the group, the size of the group, the skills and experience of group members, and the motivation and goals of group members. It also depends on group maturity (the ability and willingness of group members to set goals and work toward the accomplishment of those goals). An effective facilitator leader will learn to quickly consider all of these factors and choose the best leadership style for the situation.

A comparison of the traditional directive leader and the facilitator leader is in order since most people, in the United States as well as Mexico, tend to equate leadership with the directive style of leadership.

Directive Leader	*Facilitator Leader*
Leads from in front	Often leads from behind
Uses one style	Uses all three styles
Gives orders, make statements	Relies more on questions and suggestions
Focuses on leader's strengths	Focuses on group's needs
Person of action	Sensitive, thoughtful person
Know-it-all	Seeks help from others
Says, "Don't just sit there, do something."	Says, "Don't just do something, think about it first."

As skill increases a facilitator will be able to shift from a directive to a democratic to a nondirective style as appropriate. When the group is able to make decisions and take responsibility for its own concerns, the facilitator will be prepared to relinquish leadership in order to give attention to other opportunities. The new division director and the consultant had agreed that facilitator leadership would be appropriate in order to meet the purpose of the workshop.

Content of the Workshop

As a part of the course taught at UDEM in 1995 the author had used a textbook which he had developed at The Pennsylvania State University then translated into Spanish. The contents of that textbook are described in the chart below. Each of the 15 chapters includes background material on the topic. questions for group discussion, and exercises for learning skills and applying them to community situations outside the classroom.

Chart I
Table of Contents
Comunidades para el siglo 21 (Getting Results: A Guide to Effective Leadership)

Chapter
1. What is your leadership style?
2. Habits and attitudes of leaders
3. Group identity and direction
4. Teamwork
5. Getting people to support your cause
6. Motivating people in volunteer groups
7. Speaking up for yourself
8. Teaching others
9. Resolving differences
10. Resolving conflicts
11. Moving from ideas to action
12. Managing projects
13. Making formal meetings work
14. Making informal meetings work
15. What's wrong and how to fix it

The new division director and the consultant had agreed to use this textbook for the workshop and concentrate on chapters three and four. A copy of the textbook was provided to each participant prior to the workshop.

Sequence of the Workshop

The new division director and the consultant agreed that they needed to assess participants' feelings about the new administrative structure and to get their suggestions as to the choice and sequence for the workshop. On the other hand, some structure was required to get started and to give the participants some basis for making choices. So an agenda for the first day, Monday, was planned to overview content options and get participant feedback. The agenda for Tuesday was left to be determined after evaluating participants' reactions to the first day.

Monday's session went according to plan. Meeting at 8:30 a.m., participants heard the new director describe the new administrative structure and explain how this workshop was designed to 1) foster teamwork and 2) initiate a plan of work for the new unit. These were the "suggested" workshop goals. Participants were asked to interview and introduce a colleague that they did not know very well. One of the interview questions was, "how do you feel about the workshop goals?" Discussion after the introductions revealed that people were not clear about the new administrative structure but accepted it and were willing to work to accomplish the suggested workshop goals.

The consultant introduced the topic of teamwork, behaviors that contribute to team building, and types of teams typically found in a university setting. Participants were asked to rate their group (all workshop participants) in terms of their ability and willingness to operate as a team (see evaluation details in results section).

Next, participants were led through several small group exercises to help them identify their own leadership styles, set personal and professional goals for the next year, use self-management techniques, identify their expectations for the workshop, and evaluate the workshop content and process for the first day. Evaluation results indicated satisfaction with the workshop process and content. Participants rated themselves "low" as a team (see results section). The consultant and the division director determined the next day's agenda based on participant feedback.

Tuesday started with a report on the evaluations from the first day and the "expectations for the workshop" identified individually by participants. A major team building exercise was initiated. Four small groups were formed to design a logo to represent the new unit. The groups reviewed examples of logos from magazines. They discussed, debated, and drafted a design to show to the other groups. Lively participation resulted from this competitive exercise which lasted the rest of the morning.

During the afternoon session the director presented a draft "mission statement" for the new unit that had been written by an advisory committee to the Rector. Lengthy discussion resulted in contradictory viewpoints and some polarization of opinions. Workshop participants were clearly divided in their support of the mission statement. Different participants expressed strong objections to different phrases in the mission statement. One of the participants volunteered to reconcile contradictory viewpoints in a new draft that he would present the next morning.

Wednesday started with his presentation. After some discussion and amendments, workshop participants enthusiastically approved the amended mission statement. The consultant then led a nominal group process to determine program priorities that would be consistent with the new mission statement. The priorities that resulted from the nominal group process were assigned to small groups formed according to participants' interests. Each small group discussed one or two of the priorities and wrote them as plans that detailed activities, responsibilities, and deadlines. The plans were presented to the workshop assembly, then discussed and modified.

Thursday started with discussion on implementation of the plans. Participants decided that they needed to address the issues of promoting the plans within UDEM and fundraising to finance the activities. They were concerned as to how to delegate responsibilitis for implementing the plan. They also wanted to discuss how to 1) recruit and work with volunteers, 2) resolve interpersonal conflicts, 3) organize orientation and inservice training sessions, 4) solve problems, and 5) evaluate results. The consultant provided mini-lectures on each of these topics cited additional information that could be found in the textbook.

On Friday, each small group presented its recommendations for the overall plan. Discussion was followed by individual expressions of commitment to implement the overall plan and to coordinate efforts with other individuals as they worked on their parts of that plan. Friday afternoon was devoted to summary and evaluation.

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Results

The group rated the content and process of the workshop to be useful to them. Results of a questionnaire administered at the end of the first day (Monday) and again at the end of the workshop (Friday) are summarized below.

Workshop Evaluation

1. Please rate this workshop on the basis of the following criteria.

Low 1 2 3 4 5 6 7 High

	Monday	Friday
a. Participation	4.96	6.58
b. Productivity	4.96	6.63
c. Team Building	4.53	6.53
d. Effectiveness of Consultant	5.37	6.63
e. Consensus Building	5.37	6.28
f. Interest & Cooperation	5.26	6.61

2. What were the strong points of this meeting?

Monday	**Friday**
(26 comments included:)	(36 comments included:)
clarified workshop objectives -8	we worked as teams -8
clarified our integration -4	interesting work -4
introducing a colleague -2	participation -3
information on leadership -2	strengthened our integration -2
participation -2	our plan -2

3. What were the weak points?

Monday	**Friday**
(14 comments included:)	(15 comments, 11 of which were "no weak points")
workshop direction was not clear -4	
we sat down together with colleagues from the same department -2	
workshop was too informal -2	

4. What improvement would you suggest?

Monday	**Friday**
more interaction -4	no improvements needed -7
quiet people need to speak up -3	

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A teamwork self-evaluation instrument was also administered Monday and again on Friday. The 13 criteria below were put on a wall chart. Each participant was given a red marker to indicate, on the chart, how the group scored on each of the criteria.

Teamwork Self-Evaluation

Evaluate how well this group is operating as a team. Rate each variable by marking under one of the numbers on the 1 to 7 scale. This will indicate how close you feel your group is to either extreme.

Bad 1 2 3 4 5 6 7 **Excellent**

1. INTIMACY AND RESPECT
2. OPEN COMMUNICATION
3. LISTENING
4. CLEAR OBJECTIVES
5. MUTUAL SUPPORT
6. CONSENSUS DECISION-MAKING
7. FACILITATIVE LEADERSHIP
8. FUN
9. USE OF MEMBERS' RESOURCES
10. MUTUAL TRUST AND CONFIDENCE
11. CONFLICT MANAGEMENT
12. INVOLVEMENT
13. FLEXIBILITY

The marks tended to cluster around the "3" on Monday for all of the criteria. On Friday the scoring was repeated on a clean wall chart with a black marker. The marks tended to cluster around the "6" at the end of the workshop. Since no precise numbers were circled, averages cannot be calculated. This fact is a problem in communicating results clearly in this paper but it was very effective in demonstrating progress in a graphic manner for the workshop participants.

From these two evaluations the consultant concluded that the workshop goals were met. Six months later participants reported that they were still following their plan and that some of its objectives had been met.

Conclusions

The workshop was successful. The keys to the success of this workshop, and to acting as a collaborative consultant were the following: 1) thorough preparation for possible workshop topics must be tempered by flexibility in presenting those topics; 2) initial structure is necessary but it must be balanced by the needs of the participants; 3) options are necessary at each step in the workshop; 4) choice and sequence of the topics came from the needs of participants as they worked on workshop goals; 5) group exercises were important to allow group members to practice teamwork and program planning without having the outcomes determined in advance; and 6) use of workshop participants to present topics and to summarize group work help bridge the gap between the local culture (including UDEM) and the experience of the consultant.

Educational Importance

From this consulting experience and similar experiences of the author in Indonesia (Etling, 1977), Navajo Nation in 1983, Durango, Mexico in 1986, Costa Rica (Etling, 1991), and Puerto Rico in 1992 and 1994, the author developed the following list of principles.

Principles to Guide the Collaborative Consultant.

Preparation

1. Get as much background as possible on the situation.
2. Clarify my own values about education as they relate to the situation.
3. Anticipate issues and problems.
4. Prepare alternative approaches for resolving the issues and problems.
5. Review this checklist before working directly with the local group or community.

My Personal Value Positions

1. The learner should help determine learning objectives.
2. Educational efforts should increase the independence of learners.
3. Collaborative consultation efforts should encourage local initiative, self-help and innovation.
4. Collaborative consultation efforts should foster critical awareness to identify and analyze problems.
5. Collaborative consultation efforts should promote action to resolve problems.
6. Collaborative consultation efforts should emphasize common sense approaches as much as theoretical approaches.
7. Collaborative consultation efforts should have immediate and practical benefits to learners.
8. Collaborative consultation efforts should avoid excessive structure, programmed systems, and centralization.

Introducing Myself

1. Start with an informal dialogue in a relaxed environment.
2. Establish credibility by showing interest, asking questions, and indicating preparations made to work with the group or community.
3. Invite community members to describe the situation, then clarify it by tactfully asking questions.
4. Accept the needs identified by clients as the starting point.
5. Establish myself as a collaborative consultant by:
    a. dialogue on personal values
    b. encouraging teamwork
    c. modeling facilitator behaviors
    d. emphasizing the problem rather than my expertise.

When I am Viewed as an Expert

1. Offer options not solutions.
2. Dialogue, explore alternatives.
3. Emphasize their expertise.
4. Demonstrate respect for others.
5. Build confidence in others.
6. Support their efforts to define or redefine the problem.
7. Question, listen and point out possible solutions from the answers.
8. Use nonverbal communication to support others.
9. Avoid paternalism and manipulation.
10. Keep the responsibility for solving the problem on the members of the group/community.

As the Situation Develops

1. Transfer leadership to others but share responsibility.
2. Transfer skills and information in order to make myself more dispensible.
3. Try to lower my own profile as time passes.
4. Observe local ceremonies, customs, and hierarchies while keeping the problems and values in focus and foremost.
5. Emphasize participatory and "hands on" discussion and learning.
6. Avoid "pulling rank" by using my titles or experience as a defensive or offensive weapon against those who disagree with me.
7. Suggest procedures that might be followed to gather more information.
8. Treat others as equals as much as possible (slightly more than the client is comfortable with, but not enough to destroy communication).
9. Avoid taking myself too seriously.
10. Review this checklist occasionally.

Analyzing Alternatives

1. Consider the effects on all involved.
2. Check each alternative against the personal value positions (above).

Post Mortem

1. Communicate problems/issues yet unresolved in a final discussion or by letter (preferably both).
2. Communicate confidence in community members to carry on.

Why are collaborative consultants desirable? In order to promote people's participation. Why is participation desirable? According to many authors (Kindervatter, 1977; Ford, 1990; M. Smith, 1989; and R. Smith, 1990) people's participation is necessary for effective educational programs and for community development.

In this century most of the world population has been deeply affected by colonialism, World War II, the Cold War, independence movements which have often been turbulent, and a period of regional wars and tensions. With few exceptions, world leaders during this time have used an authoritarian (directive) leadership style. Military leaders, political "strongmen," and fundamentalist religious leaders have far outnumbered leaders like Gandhi or Martin Luther King. Even in newly independent nations the leaders have usually imitated the leadership style of colonial administrators rather than attempting participatory programs. Most decisions affecting people have been made "at the top" rather than at a "grassroots" level.

In times of turbulence and scarce resources, such a "top down" mode of decision making is understandable. Even in extension work technology transfer and innovation have been consciously directed toward the "better-off" farmers who are the innovators and early adopters. This approach, however, is being questioned. The Food and Agricultural Organization (FAO) of the United Nations held a global consultation in Rome in December, 1989, on the need to improve extension services. "The consultation found that the *trickle-down* theory of extension--that extension messages flow from the better-off to the poor--had *limited validity* " (FAO, 1990). The consultation concluded, "In many countries, the extension service will have to make greater efforts to adopt the participatory extension approach and mobilize farmers' and other community organizations" (FAO, 1990).

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THE IMAGE OF MICHIGAN STATE UNIVERSITY EXTENSION AS PERCEIVED BY COUNTY EXTENSION ADVISORY COMMITTEE MEMBERS AND EXTENSION FIELD STAFF IN MICHIGAN

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Introduction

Image is important. Any responsive organization, institution, or agency, be it private or public has a strong interest in knowing and understanding how the public are viewing the programs and services they are providing. If the public perceptions of the image of an organization is negative, it has impact on many aspects of that organization including but not limited to staff morale, staff support and commitment, and clients support and commitment.

A current image of an organization is a function of its past records (Kotler and Fox, 1985). For more than eight decades, the Cooperative Extension Service (CES) have been providing educational programs to the people of United States. In order to continuously meet the changing needs of the people, the programs of the Cooperative Extension Service are responsive, diverse, and above all evolving. These unique characteristics of the programs helped to create and build a positive image for the organization. In their 1984 study, Warner and Christensen also documented the fact that the image of the Cooperative Extension Service evolved overtime through contact and familiarity with the organization's programs and services. And, as publicly funded organization, maintaining a positive image in the minds of its clients, customers, and supporters is crucial to its survival. Decker (1979) stated that "the success or failure of Extension program is influenced by many factors. However, it is doubtful that any is more important than the image of the extension agent." Boyle and Mulcahy (1993) wrote: "It's obvious to all of us that the image of the Cooperative Extension today is as out of date as the image of Ozzie and Harriet as the typical American family."

These compelling statements about the status of the image of the Cooperative Extension Service and its importance to the existence of the organization highlights the need for conducting regular studies on the image of the organization. At this point, this study is particularly important in view of the tremendous amount of changes the Cooperative Extension Service at both federal and state levels have undergone in their policies, organizational structure, and programming process. These changes were implemented to enhance the public image of the organization as well as its visibility and viability in the 21st century. The changes specifically in programming moved Extension from "disciplinary" programming to "issues" programming. This concept was adopted and implemented at the federal level and in many states including Michigan. The shift has led some people to feel that the Cooperative Extension Service has made major changes in its programming process and emphasis. The question now is. Have these changes affected the image of the organization?

Purpose

The purpose of the study was to assess the current image of Michigan State University Extension (MSU-E) as perceived by the County Extension Advisory Committee members and Extension Field Staff in Michigan who participated in the issues identification process. The areas assessed were personnel and services of the organization. Specifically, the study attempted to:

(1)determine the perceptions of County Extension Advisory Committee Members towards the image of the personnel and services of Michigan State University Extension (MSU-E).

(2)determine the perceptions of Extension Field Staff towards the image of the personnel and services of Michigan State University Extension (MSU-E).

This study was guided by three hypotheses. The alpha level was set at .05 percent level.

(1)There were significant differences in the perceptions of County Extension Advisory Committee Members towards the image of Michigan State University Extension based on the demographic variables of gender, age, educational level, occupation, place raised, and income.

(2)There were significant differences in the perceptions of Extension Field Staff towards the image of Michigan State University Extension based on the demographic variables of gender, age, position, programming area, place raised, and place of residence.

(3)There were significant differences between the perceptions of County Extension Advisory Committee Members and Extension Field Staff towards the image of Michigan State University Extension.

Methodology

The research design was descriptive, employing sample survey methodology. The target population for this study consisted of all County Extension Advisory Committee Members and Extension Field Staff in Michigan. The accessible population of the study consisted of 1636 County Extension Advisory Committee Members and 298 Extension Field Staff who participated in the issues identification process. A stratified, systematic random sampling technique was used to draw a sample of 95 subjects for the County Extension Advisory Committee Members and 76 subjects for the Extension Field Staff.

The questionnaire was divided into three sections. Section 1 deals with personnel. Section 2 was on the services, and the demographics and general comments questions were in section 3. In section 1 and 2, a five point, likert-type scale was used to elicit the opinions of respondents. The questionnaire was reviewed by a panel of faculty and graduate students in the Department of Agricultural and Extension Education at Michigan State University to ensure validity. Changes were made accordingly.

To ensure reliability, the questionnaire was pre-tested in Jackson County, Michigan using subjects that were in the population of the study, but not among the selected sample of the study. Again, changes were made based on the comments and suggestions made by the subjects. The reliability of the questionnaire was further assessed statistically using Cronbach alpha reliability test. The reliability coefficient of 0.85 and 0.88 were established for sections 1 and 2, respectively.

Dillman's total design method (TDM) was used in administering the questionnaire. The response rate was 83 percent. Non-response was controlled in two fold - (1)by making every effort possible to solicit as much responses as possible by following strictly all the procedures of the total design methods, and (2)comparing early and late respondents. No significant differences were found in the demographic characteristics of the early and late respondents except in their educational level. This permits the results to be generalized to the survey population. Collected data were analyzed using basic descriptive statistics such as frequencies, percentages, mean, mode, etc. to describe the demographic characteristics of respondents, and t-tests and analysis of variance to test for the null hypotheses as well as measure and describe the image of the personnel and services of the Michigan State University Extension.

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Findings

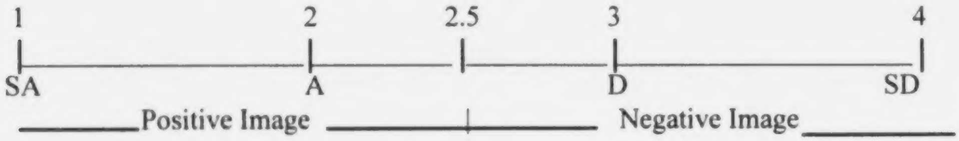
Findings were divided into two sections. Section 1 covered the demographic characteristics and section 2 covered the three hypotheses tested.

(I) Demographic Characteristics

Most of the respondents were females, 54.1% among County Extension Advisory Committee Members and 61.5% among Extension Field Staff. The modal age for both groups is 45 to 55 years and no one was older than 66 years among the Extension Staff. Respondents were well educated. Approximately 25.4% of the County Extension Advisory Committee Members and 67.1% of the Extension Staff had finished four year college. Nobody with less than four year college education were found in or among Extension Staff, while on the other hand, 29.5% and 18.3% of the Advisory Members had two year college and high school education, respectively. The majority of the respondents were raised on farms, however, most of them are now residing in rural but non-farm areas.

(II) Finding Relevant to the 3 Hypotheses

The hypotheses were tested using t-tests and analysis of variance. Same tests were also used to measure and describe the image of the personnel and services of the Michigan State University Extension (MSU-E). A composite mean score for the overall (total)questions and for each of the two sections (personnel and services) were computed and used to measure and interpret the image perceptions. A low mean score near 1 indicated a strong positive image while a high mean score near 4 indicated a strong negative image. Below is the graphic scale used in measuring and interpreting the image perceptions.



Scale of image measurement
Source: Crunkilton, Miller, and Lee (1986)

Findings relevant to hypothesis 1

(1)Based on Gender

- At .05 level, no significant differences were observed between the perceptions of males and females County Extension Advisory Committee Members towards the image of the personnel, services, and the overall (total) image of Michigan State University Extension.

- Respondents were in general positive towards the images of the organization but females with the mean scores of 2.11 and 2.17, were slightly more positive towards the overall image and image of the services of the organization than males with 2.26 and 2.24 mean scores.

(2)Based on Age

- There were significant differences recorded in the perceptions of the Advisory Members towards the image of the services of Michigan State University Extension based on age. Younger groups between the ages of 23 to 33 years and 34 to 44 years were more positive than older groups age 45 and up.

- No significant differences were detected in their perceptions towards the image of the personnel and the overall image of the organization.

(3)Based on Educational Level

- No significant differences were detected towards the image of the personnel, services, and the overall (total) image of the organization. However, a review of the mean scores across the three sections revealed that respondents with the lowest and highest level of education (high school and graduate education) were slightly more positive towards the three images than those with 2 and 4 years college education.

(4)Based on Occupation

- Significant differences was recorded in the way Advisory Members perceived the image of the personnel. Respondents who identified themselves as government employees were more positive(mean 2.14) towards the image of the personnel of Michigan State University Extension than farmers, business people, and others with the mean scores of (2.30), (2.42), and (2.39), respectively.

- There were no significant differences observed in the image of services and the overall (total) image of the organization.

(5)Based on Place Raised

- No significant differences were detected in either the personnel image, services image, and overall image of the organization based on the place were respondents were raised. But the mean scores showed that respondents who were raised on farms (2.08) as well as those raised in cities (2.07) were slightly more positive towards the overall image of Michigan State University Extension than those raised in rural but non-farm areas (2.23) and towns (2.13).

(6)Based on Income

- No significant differences were observed in either of the three sections studied. A close review of the mean scores revealed that respondents with an income ranging between $36,000 to $41,000 perceived the image of the personnel of Michigan State University Extension more negatively (2.55) than any other income groups in the study. This mean score was among the few scores that actually fall within the negative continuum.

Findings relevant to hypothesis 2

(1)Based on Gender

- At .05 level, there were no significant differences detected in the perceptions of males and females Extension Staff regarding the image of the personnel, services, and overall image of the organization. Both males and females staff have equally rated the image of the personal (2.43) as positive.

(2)Based on Age

- A statistically significant differences was recorded in the way Extension Staff perceived the image of the services of Michigan State University Extension. Younger Staff between the age of 23 to 33 years with the mean score of 1.97 were more positive than the older staff ages 34 to 44 years, 45 to 55 years, and 56 to 6 years with the mean scores of 2.34, 2.54, and 2.37, respectively.

- No significant differences was observed in the other sections studied.

(3)Based on Position

- No significant differences were observed in either the image of the personnel, the image of the services, and the overall (total) image of the organization. A review of the mean scores in all the three sections revealed that both Directors and Agents were in general positive towards the images of the organization as their mean scores were below 2.50.

(4)Based on Programming Area

- There were no significant differences observed in all the three sections studied.
- Despite the absence of significant differences, the mean scores showed 4-H and Home Economic programming staff with the mean scores of 2.22 and 2.23 were slightly more positive towards the overall image of the organization than Agric. and Natural Resources (2.28) and Community Development (2.30) programming staff.

(5)Based on Place Raised

- No significant differences were observed in all the three sections. But, the mean scores showed that staff who were raised on farms and in rural non-farm areas with the mean scores of 2.25 and 2.23, respectively, were slightly more positive towards the overall image of Michigan State University Extension than those raised in towns (2.35) and cities (2.40).

(6)Based on Place of Residence

- No significant differences were observed in the personnel, services, and overall images of the organization based on the respondents place of domicile. Regardless of where they were living - city, town, farm, or rural non-farm areas, Extension staff were in general positive towards images of Michigan State University Extension. However, those who were living on farms (2.20) were slightly more positive than those living in rural non-farm areas (2.28), towns (2.22), and cities (2.25).

Findings relevant to hypothesis 3

When the County Extension Advisory Committee Members and Extension Field Staff were compared, significant differences were observed in the way they perceived the image of the services and the overall image of the organization. No significant differences were detected in the image of the personnel.

- On image of the services of Michigan State University Extension, Advisory Members with the mean score of 2.19 were more positive towards it than Extension Staff with 2.40 mean score.
- Similarly, on the overall (total) image of the organization, the Advisory Members were more positive with the mean score of 2.12 than Extension Staff with 2.25 mean score.

Conclusions

The following three conclusions were drawn based on the findings of the study:

(1)There were very few statistically significant differences found among both County Extension Advisory Members and Extension Field Staff regarding the image of the personnel, services, and the overall (total) image of Michigan State University Extension based on the selected demographic variables.

(2)Despite the few differences observed, the study showed that image, being the sum of beliefs, ideas, and impressions that one has on object, can be influenced by certain demographic variables of age, gender, income, etc.

(3)In general, the trends produced by the mean scores across all the three sections studied indicates positive perceptions of the organization as most of them were below 2.50.

Recommendations

Measuring an organization's image is a very useful step in understanding what is happening to that organization. A positive image is hard to create, build, and maintain by any organization. It is a constant efforts. Despite an overwhelming positive findings of this study, the Michigan State University Extension (MSU-E) need:

(1)to develop and implement a strong public relations campaign to improve the image of the organization particularly the personnel. This is where significant differences were observed more than any other area. These programs must be organized and directed to specific groups or categories of people who expressed concerns or doubts about the personnel in this study.

(2)the orientation program(s) for newly employed staff of the organization to be reviewed more regularly or to new one developed to integrate all the changes that happened or about to happen in the organization regarding programs and services.

(3)to orient all staff particularly county staff towards familiarizing themselves with all services and programs of the organization, not just one or two areas one specialized in.

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Session I **Extension Training**
Session Chair - Betty Wells
Adams Room

TITLE: Participatory Management Training Needs of Extension Personnel in Zambia
AUTHORS: Robert A. Agunga, Mary C. Kimball
The Ohio State University
DISCUSSANT: Gustav Duvel

TITLE: A Review of the Journal of International Agricultural and Extension Education
AUTHORS: Rama Radhakrishna
The Pennsylvania State University
Satish Verma, Louisiana State University
DISCUSSANT: Steve Jones

TITLE: Participatory Training Programs that Prepare Women to Enter the Mainstream of Extension
AUTHORS: Dorothy M. Wanyama, Kitale, Kenya
Roger E. Steele, Cornell University
DISCUSSANT: Steve Jones

TITLE: Inservice Training Needs in Appropriate Technology as Perceived by International Agricultural Development Workers
AUTHORS: Samuel C. Allen, University of the Philippines
Michael E. Newman, Mississippi State University
DISCUSSANT: Rama Radhakrishna

Session I

PARTICIPATORY MANAGEMENT TRAINING NEEDS OF EXTENSION PERSONNEL IN ZAMBIA

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Abstract

Agricultural development is identified by the Government of Zambia as a major priority area for its National Development Plan of the 1990s. However, effective agricultural production requires a well-trained extension service yet it is not clear how well-trained are Zambia's field extension agents to effectively carry out the government's agricultural development policy. This training needs assessment study was designed towards meeting the Governments agricultural development objectives. Needs assessment is a tool that helps to minimize risk and paints the picture needed by the program planners to ensure relevancy. The main purpose of the study was to identify training needs of field extension officers who work at the village level, as a way of developing the human capacity of the Zambian extension service. The study found that field extension workers are more satisfied with their jobs when their supervisors are better communicators, involve them in decision-making processes, make them feel a part of the department, allow them to use their skills and abilities, and provide variety and challenge to the job. The study also found that Field extension officers are severely deficient in interpersonal communication, print communication, radio broadcasting and programming, audio visuals, and organizational communication skills.

Introduction

In 1989, the World Bank published a report titled Sub-Saharan Africa: From Crisis to Sustainable Growth - Long-Term Perspective Study (LPTS) in which the Bank noted that African economies must grow by 4 to 5 percent a year if hunger was to be averted and productive jobs and rising incomes secured for their growing populations (World Bank, 1989). Zambia was identified as one of the sub-Saharan countries faced with a multitude of development restraints, with low food production as the overriding concern.

Agriculture is identified as a major priority area for Zambia's development. Largely as a result of a boom in the price of copper in the early 1970s, Zambia's agriculture was neglected as people flocked to the mines and industrial jobs. However, by the mid-1970s, the prices of copper began to decline and with that a downward dive of Zambia's economy. The Willy Brandt Commission which was formed in response to World Bank President Robert McNamara's request for such a committee to investigate and report on the problems of the poor countries and how best the Bank could help them, cited in its report the plight of Zambia by the mid-1970s:

> Zambia enjoyed a boom in copper prices from 1972 with the price peaking in April 1974 at $3,034 per ton but this suddenly fell to $1,290 before the end of that year. However, its imports continued to rise so that the volume of imports that Zambia could buy fell by 45 percent between 1974 and 1975 and the Gross National Product (GNP) fell by 15 percent. (p. 145)

The Willy Brandt Report noted further that while the oil crisis of 1974 probably resulted in an increased oil bill of about 2.5 percent of GNP to the industrialized countries the impact on Zambia was six times greater and much more severe, in human terms.

The task of the Zambian government since the 1980s, has been to return agriculture to the forefront of national development. The overall goal of the Zambia Ministry of Food and Fisheries (MOFA) is to produce sufficient food to feed not only the increasing rural population but also the urban population which accounts for about 50 percent of Zambia's 8.3 million people. The MOFA also seeks to produce cash crops for export that would earn foreign exchange for the country in light of falling copper prices (Wanchinga et al., 1995).

Problems of Agricultural Extension in Zambia

However, effective agricultural production requires a well-trained extension and other agricultural staffs. Wanchinga et al note that increasing agricultural production will require the creation of an enabling policy environment, and the production, transportation, storage and marketing/exporting of produce with minimum losses" which, in turn, entails "the training of adequate agricultural human resources beginning at the farmers' level through vocational/artisan (certificate), technician (diploma) and professional (degree and above)."

The extension service has a crucial role to play in disseminating technological information and material resources to farmers. Lof & Mulele (1990) note that Extension can be an effective instrument for changing farmers' behaviors and attitudes.

Since Zambia's independence in 1964, the extension service has undergone significant changes, in an effort to increase its efficiency and hence increased food production. Before 1964, extension work was limited to serving only large-scale, European-settler commercial farmers. Since independence, the government has tried to redirect the efforts of extension towards small-scale producers, who constitute a large agricultural population.

However, government efforts to increase agricultural production through support for small-scale producers continues to yield less than expected results. The average rate of agricultural growth has remained at only about 1.7 to 1.9 percent per year, while population growth has increased to about 3.1 percent per year since 1980 (Bagchee, 1994). It would seem that one way to significantly increase agricultural production among subsistence farmers is to critically examine the effectiveness of the extension service in providing farmers with information and material resources.

An effective agricultural extension organization serves as the link between research and the farmer, and also acts as the facilitator of development. Although Zambia restructured its extension service in 1978 by adopting the Training and Visit System (Benor and Harrison, 1977), the strategy failed to increase food production after nearly two decades. Zambia is not the only developing country which has found the T & V System ineffective. Hulme (1991) and Swanson & Claar (1984) note that although it has been the dominant force for change in Third World extension systems in the 1970s and 1980s, it's appropriateness and achievements have been strongly challenged.

A more fundamental Extension problem often masked by the fanfare and huge financial investments T & V often brings, is critical analysis of the quality of extension personnel. How well-trained are they? How much do they know about the dynamics and complexities the development process entails? Without addressing these fundamental questions any financial investment in extension is likely to yield undesirable results. Hulme (1991) notes that between 1974 and 1984, about $2.3 billion dollars was spent by the World Bank for T&V system projects yet nowhere is it stated that these investments are made based on a critical examination of the quality of field staff to implement the T & V System successfully. A "training needs assessment" of extension agents' abilities to work effectively with farmers and other change agents must be assessed as the basis for developing a sound extention education campaign.

Case for a Training Needs Assessment

A systematic assessment of extension officers' training results in real improvements in performance. John Dewey drew national attention in 1933 to the importance of including the learner's perspective in curriculum decisions (Rossett, 1987). Today, this solicitation of opinions and feelings of stakeholders is called "needs assessment," or better yet, training needs assessment (TNA).

There are many definitions of needs TNA. Rossett (1987) it is "the systematic study of a problem or innovation, incorporating data and opinions from varied sources, to make effective decisions or recommendations about what should happen next" (p. 3). A needs assessment is a tool for constructive and positive change - not changes solely driven by controversy, "quick fixes," and situation crises, but rational, logical, functional change which meets the needs of citizens, educators, and learners (Kaufman, 1979, p. 8). The primary focus of TNA is determining the gap between "what is" and "what should be." Kaufman defines needs assessment as "a formal process that determines the gaps between current outputs or outcomes and required outcomes or outputs; places these gaps in priority order; and selects the most important for resolution." The nature and importance of these gaps are critical, for if emphasis is placed on trivial needs, then the results that sought will most likely not occur. Also, wrong pursuits will result in wasted time, money and other limited resources.

Zemke (1985) further describes needs assessment as the classical approach to determining needs by identifying the discrepancy between desired and actual knowledge, skills and performance. The discrepancy then is the actual training needed to address the proble.

Importance and Justification of Training Needs Assessment

It is crucial to paint a clear picture of the opinions and ideas of the problem based on those people directly involved. Needs assessment is a tool that helps to minimize risk and paints the picture needed by the program planners to ensure relevancy. If we are to change, it makes sense to correctly identify that which should be changed; armed with this information, we are better able to select the appropriate interventions to bring about the required change (Kaufman, 1979).

Involving people in the process of needs assessment is the key to success and relevancy. For the assessment to be responsive, it must involve people in the identification of needs, as one can't design effective training programs without knowing the requirements of the trainees (Cline & Seibert, 1995). If the outcomes of the TNA are to be valid, and accepted by the people it intends to serve, it must involve three general groups: learners, educators, and community members.

If the needs assessment is well designed and executed, the effectiveness of the training will be increased. Beginning with objectives that are measurable and precise, TNA will provide the clearest possible picture of the gaps to be closed. The objectives must also be worthy and important to the people who are taking part in the needs assessment, to gain ownership and accomplish positive change down the line. Needs assessment can be described as a humanizing process to help make sure that time is utilized in the most effective and efficient manner.

Another added reason for conducting a training needs assessment is to involve people in their own development. The United Nations Development Program (1992) notes that it is not development unless people are the focus. It adds that human development calls for participation by the people involved. Needs assessment meets that challenge by requiring that information to be used for change be collected from the people for whom the change will impact.

Learners must be included as they are the targets of the educational process. By including their ideas and opinions, determination of educational needs and goals will be possible, while also bringing them "into the fold" of the process. Educators must be involved because they are the implementors; they have additional knowledge and experience of current and future educational requirements that the learners may not be aware of. Community members are the third group, and are important because they are often the final recipients and their happiness the ultimate indicator of development success. They too should have a share in determining needs so that future results will be appropriate to them.

Farmers' Survey

The Zambia Institute of Mass Communication (ZAMCOM) has been offering short-term training for journalists ever since it was founded in 1971. However, following the Government of Zambia's policy to privatize many public institutions, ZAMCOM requested to be granted the status of a "public trust," that is, it will utilize public facilities and provide services to public agencies but it will be responsible for sustaining itself through generating its own funds. ZAMCOM's requested was approved by Parliament in 1995 and signed into law by the president last year.

One area ZAMCOM hopes to generate income for self-sustainability is to conduct needs assessment studies for clients and ultimately to design and conduct training programs resulting form such studies should clients so request. To assist ZAMCOM embark on this TNA research activity, Southern University Democratic Government Project, a United States Agency for International Development Project in Zambia committed to promoting democratic governmance in that country, offered to fund such a pilot study. The idea was to assist ZAMCOM develop research skills to conduct TNA. The MOFA also agreed to be ZAMCOM's first client. As the experimental client, MOFA was to receive the study free of change but on condition that it will implement training activities revealed in the study findings for a fee. A consultant was recruited to assist ZAMCOM in the development of a questionnaire, analysis of the data, make conclusions about the needs of the client and provide guidance regarding implementation of training activities. This study is a part of a comprehensive investigation by ZAMCOM.

Purpose and Objectives of the Study

The general purpose of the study was to discover the training needs of both camp and block extension officers aimed at developing the capacities of the Zambia's field extension workers at the grassroots. Specific research objectives were:

1. To determine what factors influence job satisfaction of field extension workers;
2. To determine proficiency in management skills of block supervisors;
3. To determine current communication skills of extension workers;
4. To determine specific educational/training needs for field staff ; and
5. To determine extension officer's knowledge of development and the social sciences.

Research Methodology

This study was a survey, with a questionnaire that was administered by a team of four highly qualified data gatherers--two with bachelor degrees, one Master's and the other a doctorate degree. The population of 45 field extension officers was selected by Provincial and District Agricultural Officers in 4 out of 9 Provinces where the data were collected. This represented only 5% of the population. Due to severe resource limitations, it was not possible to select a sample from the entire country. The census had a 100 percent response rate, and data analysis was done using the Statistical Package for the Social Sciences (SPSS-PC). The provinces were the study took place were Eastern, Southern, Northern, and Central.
An interview schedule was used to collect the data. It was adapted from two sources: A standard TNA questionnaire developed by The American Society for Training and Development (ASTD) as a Trainer's Toolkit, and an instrument on baseline data gathering developed by one of the researchers. The basic content of the instrument centered on field extension officer responsibilities in Zambia and skills necessary to function in this position. The instrument was organized into five sections: 1) demographics of the field extension officers, 2) assessing supervisor's performance, 3) job satisfaction, 4) assessing professional development needs, and 5) assessing of farmer needs.

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Table 1
Cronbach's Alpha Correlation Coefficient for each Survey Instrument Construct as Represented by Question

Item	Questions	Coefficient
Job Satisfaction	1, 5	.84
Supervisor Performance	1, 2, 6	.97
Communication Skills	3, 6	.86
Development Concepts	4	.89
Professional Development	2, 3, 5, 6	.95

The interview schedule was written in English and translation issues were discussed with the interviewers in Zambia before data collection. A panel of experts who reviewed the instrument included 3 professors and 11 Agricultural extension education graduate students at The Ohio State University with African experience. The panel made suggestions on content and face validity, including suggestions on structure, wording, clarity and specificity of the questions which the researchers took into account. Cronbach's Alpha correlation coefficient was calculated for each set of items representing a research construct to test for consistency of responses as a measure of reliability. For each construct, the resulting coefficient was .84 or greater. Coefficients for each item are listed in Table 1 above.

A letter of support, written by the Director of Agriculture, was sent to the Provincial Agricultural Officers in the selected provinces urging the officers there to participate in the study. Data gathering took two weeks with the four interviewees working in pairs. The relationship between the variables was measured according to the ordinal or nominal nature of data. Kendall-Tau coefficient was used to describe relatioship.

Results

The results of the study are presented below in summary form according to each objective:

Characteristics of Respondents

Several demographic questions were asked, including age, marital status, years of service in the MOA and highest level of educational attained. A summary profile of the extension officers in this study are as follows.

1. Age: Average age of the 45 officers studied was 37.6 years with 23 (51%) between the ages of 24 and 36. The range was from 24 to 58 years, with six officers over 50 years.
2. Marital status: About 43 (or 96%) of those surveyed were married with only two single.
3. Years of experience: About 35 (78%) of the field extension officers had worked with the Ministry of Food, and Fisheries for at least 6 years; 11 officers (24%) had over 15 years.
4. Highest level of education: Of the officers surveyed, 42 (93%) were graduates of agricultural colleges, while the remaining three had either completed middle or secondary school. None had BS, MS, or Ph.D degree(s).

Objective 1
To Determine What Factors Influence Job Satisfaction of Field Extension Workers

Questions were asked to solicit information on job satisfaction. The "grand mean" for all the items (see Tables 2 & 3) was calculated and the "mean difference" for each item arrived at by subtracting the mean for the item from the grand mean. The equation is as follows: X - X (item) = Mean Difference.

Table 2

Means and Mean Differences for Items Related to the Importance of Job Satisfaction of Field Extension Officers

Items of Job Satisfaction	Mean Importance*	Mean Difference
1. Opportunity to use my skills and abilities	4.3	+.3 (Highest
2. Sense of belonging to your department	4.3	+.3
3. Variety and challenge	4.2	+.2
4. Opportunity for further education	4.2	+.2
5. Level of commitment and enthusiasm	4.2	+.2
6. Opportunity to participate in something worthwhile	4.1	+.1
7. Level of trust and confidence in your supervisor	4.1	+.1
8. Opportunities for inservice training	4.0	+0
9. Opportunity to be creative and innovative	3.9	-.1
10. Involvement in goal-setting and evaluation of your job	3.8	-.2
11. Degree to which your supervisor supports and trusts your work	3.8	-.2
12. Level of recognition and appreciation for tasks, projects and assignments well done	3.7	-.3
13. Monetary rewards for good work	3.3	-.7 (Lowest)

* 1 = Not at all important 2 = Very little importance 3 = Somewhat important
4 = Very Important 5 = Extremely important

Mean difference gives a better understanding of the degree of importance or satisfaction within each item. Items with mean differences above the grand mean have a higher degree of importance or satisfaction than the average item, and vise versa. The items were then ranked from highest to lowest importance (Table 2) and lowest.to highest satisfaction (Table 3).

Table 3

Means and Mean Differences for Items Related to the Level of Job Satisfaction of Field Extension Officers Ranked from Least Satisfied to Most Satisfied

Items of Job Satisfaction	Mean: Level*	Mean:(2.8) Difference
1. Opportunity for further studies	1.7	-1.1
2. Opportunities for inservice training	1.8	-1.0
3. Monetary rewards for good work	1.8	-1.0
4. Level of recognition and appreciation for tasks, projects and assignments well done	2.3	-.5
5. Degree of participation in decision-making process affecting your job/work unit	2.5	-.3
6. Level of encouragement to be creative, innovative and to try new ideas	2.8	0
7. Level of trust and confidence in your supervisor	3.1	+.3
8. Opportunity to use my skills and abilities	3.3	+.5
9. Degree to which your supervisor supports and trusts your work	3.3	+.5
10. Your overall satisfaction with your job	3.5	+.7
11. Sense of belonging to, or feeling a part of your		

department	3.7	+.9

* 1 = Not at all satisfied 2 = Slightly satisfied 3 = Moderately satisfied
4 = Very satisfied 5 = Extremely satisfied

Tables 2 and 3 present these data. The means for items of job satisfaction regarding importance are above 3.3, that is, between 3.8 and 4.3, from "very important" to "extremely important." The top items of importance in Table 2, are "opportunity to use my skills and abilities," "sense of belonging to department." Those items of lowest importance were "level of recognition and appreciation for tasks, projects and assignments well done" and "Monetary rewards for good work." Field officers did rewards were as important as further education, goal setting and evaluation, and belonging to the department, perhaps because they realize that monetary rewards are dependent on level of education.

Table 3 shows items which respondents find least satisfied with their jobs. The top two are "opportunity for further studies" and "opportunity for inservice training." The highest satisfaction items were "overall satisfaction with job" and "sense of belonging to department." However, the highest mean of all items was 3.7, which just approaches "very satisfied." The data show that there is a great deal of room for improvement in all areas.

To investigate the relationship between job satisfaction and supervisor skills, Kendall Tau Coefficients were used to describe these correlations. Sums of the Likert questions for supervisor skills and job satisfaction were done in six areas: 1) importance of supervision/management skills, 2) proficiency of supervision/management skills, 3) importance of communication skills, 4) proficiency of communication skills, 5) importance of job satisfaction, and 6) level of job satisfaction. These correlations are listed below in Table 4 below.

Table 4
Correlations Between Management Skills and Job Satisfaction

	Importance Sup/Mgmt Satisfaction	Proficiency Sup/Mgmt	Importance Comm	Proficiency Comm	Job
Proficiency Sup/Mgmt skills	.56				
Importance Communication	.49	.42			
Proficiency Communication	.45	.59	.49		
Importance Job Satisfaction	.16	.30	.43	.33	
Level Job Satisfaction	.26	.16	.26	.21	.07

There is moderate to substantial correlations between items on supervisor skills and job satisfaction. There is a positive, substantial correlation (.56) between importance of the supervisor in management/supervisory skills and proficiency of those skills. Another substantial correlation (.59) is between the proficiency of supervisors in communication skills and proficiency in supervisory skills. Obviously, as proficiency in communication skills increases, the level of proficiency in supervisory skills also goes up.

Moderate, positive associations (.30 - .49) were observed in 47% of the correlations such as the importance of communication skills and importance of supervisory skills (.49) and the importance of communication skills and proficiency of supervisory skills (.43). These observations are important considerations for designing future training for field supervisors. Field extension officers recognize that supervisors who are better communicators are aalso better managers. They also recognize the importance of communication skills and its link to better supervisory skills. Finally, the importance of job satisfaction is higher when the proficiency of supervisor skills is higher.

The remaining correlations are still positive but low (.10 - .29) such as the level of job satisfaction and importance of communication skills (.26). Although these are lower than expected, they are still positive correlations. On the whole, field officers have higher job satisfaction when their supervisors have increased skills in management and communication.

Objective 2
To examine the Proficiency of Extension Field Supervisors in Managerial Skills

There were questions assessing supervisors' performance. Field extension officers were asked to rate their supervisors in supervision/management and communication/interpersonal relations skills. The mean and mean differences were calculated, as shown in Table 5.

Table 5
Mean Scores and Mean Differences for Items Related to Importance of Supervisory Performance, and Ranked from Highest to Lowest Importance

Items of Supervisor Performance	Mean Level*	Mean Difference
1. Speaks effectively in public	4.2	+.7 (Highest)
2. Works to improve the image of the MOA	4.0	+.5
3. Visits farmers in rural areas often	3.9	+.4
4. Maintains good relations with small farmers	3.9	+.4
5. Assesses employee strengths/weaknesses	3.8	+.3
6. Makes himself or herself available	3.7	+.2
7. Makes expectations clear	3.7	+.2
8. Promotes employee participation	3.6	+.1
9. Fosters group innovation and creativity	3.5	0
10. Demonstrates initiative and imagination	3.5	0
11. Handles complaints and conflicts	3.4	-.1
12. Dresses in a business-like manner	3.1	-.4
13. Effective delegation	3.0	-.5
14. Provides opportunity for growth	3.0	-.5
15. Maintains close contact with the mass media	2.5	-1.0 (Lowest)

* 1 = Not important/Not required 2 = Important 3 = Moderately important 4 = Highly important
5 = Very highly important

Unlike the mean scores of the level of proficiency in Tables 2 and 3, 42% of these means are above 3.7. Also, almost all of the means are above 3.0 (96%) and 85% of the modes are 4.0 or above. These indicate that field extension officers perceive these skills as "highly" or "very highly" important to their supervisor's performance.

Four items of importance had modes of 5.0, which were; "makes expectations clear," "improves communication in organization," "promotes employee participation" and "visits farmers in rural areas often." There is a large gap as to the importance of skills and the proficiency in which they are preformed. For example, "promotes employee participation" and "improves communication in organization" have modes of 5.0 in importance ("very highly important") but only 3.0 in proficiency ("moderate level"). Table 6 summarizes the means for proficiency of supervisors in management skills.

Table 6
Mean Scores and Mean Differences of Items Related to Proficiency of Supervisor and Ranked from Least Proficiency to Most Proficient

Items of Supervisor Performance	Mean Level*	Mean Difference (3.2)
1. Maintains close contact with mass media	1.9	-1.3
2. Liaises with research, university, and ag agencies	2.7	-.5
3. Provides opportunity for growth	2.9	-.3
4. Effective delegation	3.0	-.2
5. Handles complaints and conflicts	3.1	-.1
6. Listens effectively	3.2	0
7. Improves communication in organization	3.2	0
8. Demonstrates initiative and imagination	3.3	+.1
9. Treats people with sensitivity	3.4	+.2
10. Visits farmers in rural areas often	3.4	+.2
11. Writes reports and newsletters effectively	3.5	+.3
12. Makes himself or herself available	3.6	+.4
13. Makes expectations clear	3.6	+.4
14. Maintains good relations with small farmers	3.7	+.5

* 1 = Very low level 2 = Low level 3 = Moderate level 4 = High level 5 = Very high level

The majority of items (65%) were rated between 3.0 and 3.5, which is just above "moderate level" of skill. Of particular importance are those items with means below 3.0, which were: "provides opportunity for growth" (2.9), "liaises with research, university, and agricultural agencies" (2.7), and "maintains close contact with the mass media" (2.5). Supervisors were highly skilled in motivation, making themselves available and maintaining relations with small farmers. However, these means are still fairly low, suggesting room for improvement.

Objective 3
To Determine the Proficiency of Field Extension Officers in Communication Skills

Field extension officers were asked to rate: a) their ability to perform specific communication skills, and b) the importance of these skills to job performance. The mean difference is used to demonstrate the ranking from most important to least important and lowest ability to highest ability as shown in Table 7 below.

Table 7
Means Scores and Mean Differences of Items Related to Communication Skills of Extension Supervisors

Communication Skill	Mean Importance*	Mean Difference(3.1)
1. Public speaking	3.8	+.7
2. Conducting interviews or meetings	3.6	+.5
3. Listening effectively	3.5	+.4
4. Producing radio programs	3.4	+.3
5. Producing slide/tape shows	3.1	0
6. Using video camcorders	3.0	-.1
7. Writing business letters and proposals	3.0	-.1
8. Writing press releases	2.6	-.5

9. Using computers	2.5	-.6
10. Handling a press conference	2.5	-.6

1 = Extremely unimportant 2 = Unimportant 3 = Important 4 = Extremely important

The mean of items related to communication skills are all above 2.5, that is, mid-way between "unimportant" to "important." Agents felt they were most skilled in "public skeing" "conducting interviews or meetings." However, field observations and the apparent failure of the T & V system suggests that agents are not effective in involving people in development efforts in spite of their claim. Agents felt they were least competent in "handling a pres conference," and in "using comouters."

Table 8 shows Extension officers' knowledge of development concepts. For example, extension officers viewed women's role in development as most important. The majority (83%) of the items had means of 3.0 and above, which are considered "important" to "extremely important". It showed that field extension officers realize the importance of having extension skills as well as an understanding of basic development concepts. "Understanding the politics of developmental aid" and "the role of social sciences in development" were rated as least important to the officers, but there may be a lack of understanding of those concepts which resulted in their low ranking.

Table 8
Mean Scores and Mean Differences of Items Relating to Field Extension Officers' Knowledge of Development and the Social Sciences

Extension and Development Skill	Mean Ability*	Mean Difference (2.8)
1. The role of social sciences in development	2.3	-.5
2. Creative ways for raising funds for ag	2.3	-.5
3. Understanding the politics of development aid	2.5	-.3
4. Use of systems approach in development	2.6	-.2
5. Understanding development theories	2.7	-.1
6. How to implement participation in projects	2.8	0
7. Understanding integrated rural development	2.9	+.1
8. Extension program planning and evaluation	3.0	+.2
9. Involving farmers in extension program planning	3.0	+.2
10. Learning alternative extension systems	3.1	+.3
11. Collaborating with development agencies	3.1	+.3
12. Women's participation in development	3.2	+.4

* 1 = Poor 2 = Fair 3 = Good 4 = Excellent

For example, developing countries are traditionally very critical of the way in which aid is administered, and one would have expected that "understanding the politics of developmental aid" would have been considered important. Also, it appears that the questions may not have been properly understood.

Objective 6
Logistics of Providing Extension training

Field extension officers were asked specific questions the best times of year to organize training workshops and where the training should be held. The data gathered from these questions are presented as shown in Table 9 (a and b):

a. Best Time of Year to Offer Training Workshops for Field Extension Officers

Time of Year	Mean*	Mode
1. January - March	2.8	3.0
2. April - June	2.0	2.0
3. July - September	1.2	1.0
4. October - December	2.8	3.0

* 1 = Best 2 = Good 3 = Bad

These data indicate that for field extension officers July - September is the best time to attend training programs. January through March and October through December were considered bad times of the year for these activities, and should be avoided if the Ministry of Food and Fisheries is aiming for high attendance.

b). Location of Training to be Offered for Field Extension Officers

Location	Yes %	No%	Missing %
1. On-the-job seminars	20.0	66.7	13.3
2. At a training center in the provincial capital	82.0	4.4	13.3
3. At a training center in Lusaka	84.4	2.2	13.3
4. Just send materials in the mail	4.4	73.3	22.2

The majority of field extension officers want to attend training programs either at the provincial capital (82%) or in Lusaka (84%). On-the-job training was not preferred by most officers, with only 20% responding "yes" to that type of training. It is obvious that these officers want personal, in-depth training as they strongly rejected the option of materials sent in the mail (4.4% yes), and this type of "training" should be avoided.

Conclusions

The main purpose of the study was to identify training needs of field extension officers who work at the village level, as a way of developing the human capacity of the Zambian extension service. The main conclusions are as follows:

1. Extension officers are joining the service at a young age and staying with the job, usually for the rest of their lives. Providing them with inservice training and opportunities for further studies is essential to continued self-development and increased productivity.

2. The highest level of education for 93% of field extension agents is the agricultural improve performance which again stresses the need for inservice training and continued self-development.

3. Job satisfaction and level of proficiency of their supervisors in the areas of management and communication skills are related. The officers are more satisfied in their jobs when their supervisors are better communicators, involve them in decision-making processes, make them feel a part of the department, allow them to use their skills and abilities, and provide variety and challenge to the job.

4. The level of management and communication skills among field extension supervisors is

generally low. Agents rank these skills as being important to their supervisor's performance, yet they do not think that their supervisors possess these skills at a high enough level for success at the job.

5. Field extension officers are severely deficient in most areas of communication skills. These areas include interpersonal communication, print communication, radio broadcasting and programming, audio visuals, and organizational skills.

6. The frequency of use of any other communication method besides face-to-face was almost nonexistent.

7. Field extension agents do not seem to realize the extent and importance of most development theories and methods to their jobs.

10. Field extension officers believe that they posses enough subject matter knowledge to help farmers. They also think that they are generalists rather than specialists, which is important when eliciting their participation in training programs that are not considered subject matter related.

11. Although extension agents greatly look forward to improving their salary, they don't look forward to changing jobs or getting a second job. This further reinforces our conclusion that they are dedicated to their work and would rather improve themselves, through education, than leave the Ministry of Agriculture. This is very important to training, as they seem to feel a part of their department and are loyal to the organization, leading the researcher to conclude that they will welcome and participate wholeheartedly in training programs. Also important to this conclusion is that there are no jobs for these extension officers to move to without further education. Therefore, they don't look forward to changing jobs as they are not available.

A Review of the Journal of International Agricultural and Extension Education.

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A REVIEW OF THE *JOURNAL OF INTERNATIONAL AGRICULTURAL AND EXTENSION EDUCATION*

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INTRODUCTION

A group of 32 agricultural education faculty who were keenly interested in international development, came together in 1984 in Kansas City, Missouri to organize the Association for International Agricultural Education (AIAE). The motto for this new organization was, "A professional association committed to strengthening agricultural and extension education programs and institutions in developing countries" (Thuemmel, 1985). The organization, 12 years later, now named the Association for International Agricultural and Extension Education (AIAEE), has attracted membership from the agricultural and extension education professions and related disciplines from nearly 50 different countries. AIAEE has sought to attract a broad range of membership including students, secondary teachers, county agents, researchers, college and university faculty, administrators, consultants, staff of donor agencies, and staff of non-government and private volunteer organizations (McBreen, 1989).

One of the purposes of AIAEE is to inform its members and others about new knowledge and information in international agricultural and extension education. To do this, AIAEE publishes refereed research papers at its annual conference in the form of proceedings. So far 14 volumes of the proceedings have been published. The association also brings out a newsletter, *"The Informer,"* to keep its membership informed of current events in the organization. In spring 1994, AIAEE published the first issue of its refereed journal, *The Journal of International Agricultural and Extension Education* (JIAEE).

The *Journal of International Agricultural and Extension Education* (JIAEE) has been one of the primary outlets for publishing and disseminating research and developmental activities in international agricultural and extension education. The purpose of the JIAEE is to enhance the research and knowledge base of agricultural and extension education from an international perspective. The articles appearing in the JIAEE reflect current international research activities of the members of the AIAEE. In addition, the JIAEE also reflects, philosophical and application orientation in international agricultural and extension education activities carried out by AIAEE membership. In a membership survey conducted by Eaton, Radhakrishna and Diamond (1994), AIAEE members indicated that publications (the newsletter and the journal) of AIAEE reflected relevant issues related to international agricultural development.

Steele (1996) in his vision of AIAEE in the year 2005 indicated that *The Journal of International Agricultural and Extension Education* will have: a) become a dynamic, flexible, electronically driven publication; b) attracted a worldwide circulation; c) received significant volume of manuscripts from around the world; d) diversified the contents of the journal to include research-based, philosophical, applied and practical articles, book reviews, commentary, and feedback, etc.; and e) multilingual versions, particularly Spanish, French and Arabic.

Almost three years have passed since the publication of the first issue of the journal. Has the journal met the needs of its members? Who publishes and what is published in the journal will provide useful insights as we look to the year 2000 and beyond. Further, to what extent are we closer to the vision of AIAEE as predicted by Steele (1996). A review of the journal since its inception will help us understand, where we are, analyze our past efforts, where we would like to be, and what needs to be done in the future. As Knight (1986) indicated what an organization or a profession publishes in its journal or conference proceedings should be a good indicator of what is going on with the organization or the profession. This study was conducted to analyze the contents of the AIAEE journal.

RELATED LITERATURE

Journals are important channels for the dissemination of research information and are indispensable to educators who are active in research and development and/or teaching. According to Goldsmith (1984), journals provide an avenue for recognition for many researchers since a published journal article is the first formal presentation to the scientific community of an innovation or discovery.

Past issues of journals and conference proceedings offer the opportunity for content analysis of the major themes or trends over the years. In addition, it may also be the best source to the most current state-of-the-art literature in any discipline. Such content analyses of journals and conference proceedings have been undertaken by Radhakrishna and Mbaga, (1995); Freer, Clouse, Rocco and West, (1994); Radhakrishna and Jackson, (1992); Newman, (1990); Crunkilton (1988); Moss (1986); and Goldsmith (1983).

In a review of the *Journal of Agricultural Education* (JAE) during the decade 1980-90, Radhakrishna and Jackson (1992) found several publishing patterns. These included: 1) number of articles published in the journal had increased, 2) scholars who publish in the JAE were mostly male and they tend to publish only in six major subject matter topics; 3) most of the articles published had more than two authors, indicating that agricultural educators work together as a team; and 4) authors who published in JAE were most likely to use journals and books as major sources of citation in their research.

Newman (1990) examined reader opinions of the JAE and indicated that the readers were satisfied with the review process, format, length, quality of articles and problems addressed in the journal. However, readers suggested increasing the number of articles published per year and advertising to offset increasing costs.

Moss (1986) analyzed the contents of papers presented at NAERM for the years 1974-85. Moss found that four content areas had received considerable attention during the years 1974-1985. These were: curriculum, teacher attitudes and teacher training, supervised occupational experiences (SOE), and employment opportunities. When examined over a 12 year trend, the subject matter of curriculum has been investigated consistently by agricultural educators. Also, SOE emerged as an important topic in the early eighties. However, a majority of the topics were in the "other" category. Moss concluded that priorities for research in agricultural education are not static (p. 6).

Crunkilton (1988) examined the summaries of research and development activities in agricultural education and research in extension publications for six years (1981-82 to 1986-87). He found 67% of the studies were at senior high level, 41% in the area of curriculum/development and 54% statewide in scope. He concluded that " research in agricultural education is focused, but that focus has come about more by accident rather than through planned activities" (p. 327).

PURPOSE AND OBJECTIVES

The major purpose of this study was to analyze the content of articles published in the JIAEE for the years 1994-96. Specifically, three aspects important to the journal and the organization were studied.

1. A profile of authors who have published in the journal.
2. Scope, focus, and program areas of articles published in the journal.
3. Subject matter topics addressed by authors who have published in the journal.

METHODOLOGY

A census of all articles (N=58) published in the JIAEE during the years 1994-96 was considered for the study. A total of six issues and 58 articles were analyzed. Of these 58 articles, 50 were feature articles, two were invited articles, four were tools of the profession articles and one each commentary and book review articles (see Table 1). For the purposes of this review, only feature articles (N=50) are examined in detail.

Table 1. Type of Articles Published in the JIAEE

	Article Type					
Year/Issue	Feature Articles	Invited Articles	Commentary	Tools of the Profession	Book Reviews	Total
1994						
Spring	9	1	-	-	-	10
Fall	10	-	-	-	1	11
Total	**19**	**1**	**-**	**-**	**1**	**21**
1995						
Spring	8	-	-	-	-	8
Fall	9	1	-	-	-	10
Total	**17**	**1**	**-**	**-**	**-**	**18**
1996						
Spring	6	-	1	2	-	9
Fall	8	-	-	2	-	10
Total	**14**	**-**	**1**	**4**	**-**	**19**
Grand Total	**50**	**2**	**1**	**4**	**1**	**58**

A code book was developed to enter data from the 50 articles. This code book included information on several variables--gender, title or professional rank, number of authors, type of articles, focus, region, etc. For each of the 50 articles, information on these variables was collected and entered. Data were summarized using frequencies and percentages.

RESULTS

Objective 1-- Profile of Authors

Authors who have published in JIAEE are mostly male (76%). The majority of authors (34%) were from "other" who represented several private and public organizations, donor agencies, etc., followed by assistant professors and associate professors (18% each) graduate students (14%), professors (10%), and lecturer/instructor (6%). A little over one-third (38%) of the articles had two authors, followed by 34% single author, 24% three authors, and 4% more than three authors. Of the 50 feature articles published, 19 (38%) were outstanding research presentations made at the annual meetings. (Table 2).

Table 2. Profile of Authors who Publish in JIAEE

	Year				
Profile	1994	1995	1996	Total	%
Gender*					
Male	17	9	12	38	76.0
Female	2	8	2	12	24.0
Total	**19**	**17**	**14**	**50**	**100.0**
Title/Rank*					
Professor	2	2	1	5	10.0
Associate professor	4	4	1	9	18.0
Assistant professor	4	3	2	9	18.0
Instructor/Lecturer	1	1	1	3	6.0
Graduate assistant	3	2	2	7	14.0
Others	5	5	7	15	30.0
Total	**19**	**17**	**14**	**50**	**100.0**
Authorship					
Single	7	5	5	17	34.0
Two	7	6	6	19	38.0
Three	5	4	3	12	24.0
Four or more	-	2	-	2	4.0
Total	**19**	**17**	**14**	**50**	**100.0**
Outstanding Papers	9	6	4	19	38.0

* first authors and feature articles only

Objective 2--Scope, Focus and Program Areas

Scope of the articles was related to geographic region--Africa, Asia, Australia, Latin America, Europe, Middle East, The Caribbean, and the United States. Focus was categorized in terms of a developmental /curriculum, research-based or philosophical focus. Program areas included agricultural education, extension education and international education. Results are shown in Table 3. Sixteen of the 50 articles (32%) were related to the United States, followed by Africa (20%), Asia (18%), Central/South America (12%), Middle East (4%), Australia, Europe, and the Caribbean (2% each) and others (6%).

Forty-eight percent of the articles published in the journal had a research focus, followed by a developmental focus (24%), philosophical focus (24%), and curriculum (4%). Furthermore, 23 articles (46%) had an extension education emphasis, 17 articles (34%) an international education/development emphasis, and 10 (20%) articles an agricultural education emphasis.

Table 3. Scope, Focus and Program Areas of Articles Published in JIAEE*

	Year				
Scope/Focus/Program Area	1994	1995	1996	Total	%
Scope					
United States	4	10	2	16	32.0
Africa	5	2	3	10	20.0
Asia	4	2	3	9	18.0
Central/South America	3	2	2	7	12.0
Middle East	1	-	1	2	4.0
Australia	-	-	1	1	2.0
Europe	-	-	1	1	2.0
The Caribbean	1	-	-	1	2.0
Other	1	1	1	3	6.0
Total	**19**	**17**	**14**	**50**	**100.0**
Focus					
Research	10	7	7	24	48.0
Developmental	4	4	4	12	24.0
Philosophical	5	4	3	12	24.0
Curriculum	-	2	-	2	4.0
Total	**19**	**17**	**14**	**50**	**100.0**
Program Areas					
Extension Education	12	6	5	23	46.0
International Education	4	7	6	17	34.0
Agricultural Education	3	4	3	10	20.0
Total	**19**	**17**	**14**	**50**	**100.0**

* feature articles only

Objective 3--Subject Matter Topics

The titles and contents of the 50 articles were examined to determine subject matter topics (Table 4). Twelve articles (24%) dealt with agricultural extension, followed by such topics as internationalizing the curriculum (12%), global issues, international agricultural development, and agricultural education (8% each), youth programs, small farmers, technology transfer, indigenous/endogenous knowledge and women (6% each), environmental/ sustainability (2%) and other--leadership, dairy, and adult education (6%).

Table 4. Subject Matter Topics of Articles Published in JIAEE*

Subject Matter Topics	Year				
	1994	1995	1996	Total	%
Agricultural extension	5	3	4	12	24.0
Curriculum	-	3	3	6	12.0
Global issues	1	3	-	4	8.0
International ag development	2	1	1	4	8.0
Agricultural education	1	2	1	4	8.0
Indigenous/endogenous knowledge	2	-	1	3	6.0
Technology transfer	1	-	2	3	6.0
Youth	2	1	-	3	6.0
Small farmers	2	-	1	3	6.0
Women	-	3	-	3	6.0
Sustainability	1	-	1	2	4.0
Leadership	1	-	-	1	2.0
Dairy	1	-	-	1	2.0
Adult education	-	1	-	1	2.0
Total	**19**	**17**	**14**	**50**	**100.0**

* feature articles only

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, it can be concluded that the journal offers an array of publishing and reading opportunities to members of AIAEE.

Findings indicate a higher percentage of authors who publish in JIAEE are from private and public organizations. This is a good trend indicating that the journal is attracting manuscripts from outside academia. Also, a majority of the articles published in the journal had two or more authors, indicating collaborative efforts and team work in disseminating research findings. Collaborative efforts in and between academia and public and private organizations should be encouraged.

Articles published in the JIAEE indicate a tendency to focus more on research than on developmental/curriculum and philosophical aspects of the disciplines of agricultural education and extension education. An important question in this regard is whether there should be a better balance of articles among the several foci, or the current trend focusing research-based articles is acceptable. Closely related to this finding is the question of evaluation criteria used for different foci. A well thought out set of criteria has been established for research-focused articles and appears to be working well. The inadequacy is that the same criteria are used for developmental and philosophy-based articles. Is this appropriate or should separate criteria be developed to evaluate these types of articles submitted for publication in the journal. It is suggested that the editorial board of the journal as well as the leadership of the organization should look into this question of evaluation criteria used for reviewing articles for the journal.

While articles published in the journal represent all geographical regions of the world, there was a preponderance of articles related to the United States. Most of these U.S. related articles dealt with internationalizing the curriculum and global issues. The statement on the inside cover page of the journal reads " ...... articles intended for publication should focus on international agricultural education and or international extension education." This is the major purpose of the journal, and therefore we must attract manuscripts from U.S. educators and scholars about their work in other countries and educators and scholars from other countries.

A variety of subject matter topics in international agricultural and extension education are published in JIAEE, which provides perspectives about the research and philosophical efforts pursued by the members of AIAEE. Most common subject matter topic published is agricultural extension, which is the focus of most research efforts between the U.S. and developing countries. Curriculum was the next category wherein educators engaged in international education have discussed challenges and opportunities for internationalizing the curriculum in U.S. schools, colleges and universities. In addition, articles relative to global issues/international agricultural development have implications for both the U.S. and the developing world.

At the 1996 AIAEE meeting, the editorial board expressed concern about the number of manuscripts submitted for publication, causing problems in timely publication. It is important to recognize that in the last three years, a little over 100 papers were presented at the AIAEE annual conference, but only 50 made it into the journal (note: some papers may not have been presented at past AIAEE meetings). Even if they made it to the journal, most of them (19 articles) were outstanding research papers. There is a need to encourage members to submit more articles. In his remarks in the inaugural issue of the Journal, Meaders (1994) indicated that the audience for the journal should not be limited to agricultural and extension education professionals, but should encompass other professionals in fields such as sociology, agronomy, agricultural economics, animal science, agricultural engineering, forestry etc. Attracting broader audiences for the journal will help in improved communication and international linkages for mutual benefit. In addition, this will provide a broader scope for the journal and increase membership and circulation.

EDUCATIONAL IMPORTANCE

This analysis of articles published in the Journal of International Agricultural and Extension Education provides a useful perspective to authors and readers of the scholarly interests and views of our colleagues and the need for a broader and more balanced representation of published articles. It also poses some questions on editorial and policy matters for the journal and associations' leadership, answers to which would facilitate the review and publications process.

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Participatory Training Programs that Prepare Women to Enter the Mainstream of Extension.

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Agricultural extension has not been fair to all the stakeholders in agricultural production and other aspects of the food system. Women play an important role in agricultural production yet extension does not serve women farmers effectively. Male farmers receive services from extension agents while less attention is paid to women farmers.

The extension system in Kenya provides discriminative and unsustainable services to women farmers. Integrating women into mainstream extension will improve extension services to them. Using a gender approach increases understanding of the contribution and needs of women and men, how they relate to each other in development, and how they are affected by and benefit from development. Using a gender approach in planning extension programs will ensure gender-inclusive extension programs.

A gender training program is proposed that enables extension agents to plan extension programs using a gender approach. The proposed training program aims at training extension agents on how to incorporate a gender dimension into extension programs. The proposed gender training program will be conducted in a participatory way combining theory and practice. It will be implemented in four training phases and one evaluation phase.

Introduction

Agricultural extension has had a good record with male farmers. By treating the household as a single production unit, extension agents direct their services to men while paying less attention to women. In developing countries, women farmers produce 70-80% of the domestically consumed food and play a major role in natural resource management (Swanson, Farner, & Bahal, 1990). Despite their important role, women receive less attention from agricultural extension. The latest disaggregated data for Africa indicate that only 7% of extension services are devoted to helping women farmers (Blumberg, 1992) (Walker, 1990).

Extension needs to address gender roles if it is to improve services. It should focus on roles played by men and women in agricultural production and other aspects of the food system, and how they relate to each other in farming situations. Antholt (page 29) stresses that "it is expected that if the starting place is having an extension services that is relevant, responsive, and effective, then we need to consider women farmers as well" (Antholt, 1994).

Increasing the number of women working in extension is one way to improve extension services to women farmers. Antholt argues that the long run solution lies in recruiting more women as extension agents. He states that to improve extension services to women farmers there is need to recruit more female extension agents to deal with the female farmers. Female extension agents have been shown to be more effective in working with farmers. Increasing the number of the women extension agents alone will only be part of a solution. There is need to have extension workers (both men and women) who are not gender blind, if their impact is to be felt. Poats refers to gender blindness as the inability to perceive the different gender roles and responsibilities in agricultural production and to realize that project activities have different effects on men and women (Poats, 1991).

A gender training program is proposed to train extension personnel in gender analysis and gender planning. The proposed program will be used as a transformative tool through which the trainees will learn new attitudes, knowledge, and skills that will make them more effective in what they do (Moser, 1995). The training will first aim at sensitizing participants, enabling them to gain an understanding of gender roles and responsibilities, and how different extension activities affect women and men. The participants will then apply gender planning methodology, materials, and process to extension situations in question. This will lead to planning and execution of gender responsive extension programs, thus demonstrating gender sensitivity by the participants.

Review of the Literature

There are several approaches to agricultural extension. Countries have adopted different approaches depending on how they perceive them to be appropriate to their particular circumstances. The Training and Visit (T&V) system of agricultural extension that was developed on the premise that the existing systems lacked efficiency in organization, line of technical support, and extension staff administration has a top-down approach (Benor & Harrison, 1977). Howell argues that the top-down structure has led to insensitivity to the varying needs of the small farmers (Howell, 1982). The T&V system emphasizes a 'transfer of technology' paradigm to solve agricultural problems which does not work well with small farmers (Chambers, 1993). The use of contact farmers, who are either traditional village elders or better-off farmers, tends to reinforce local privilege for the few better-off farmers. This further marginalizes disadvantaged farmers, including women (Howell, 1982). The T&V system has not met the needs

Of female headed farm households. A study by Due found that T&V did not improve the agricultural performance of female-headed households, though there were some trickle-down effects (Due, Mollel, & Malone, 1987). Female-headed households had fewer visits than either the contact, non-contact, or non-T&V joint households. The study established that the number of female contact farmers was low. According to Weidemann, T&V needs considerable structural adaptation to reach female farmers effectively (Weidemann, 1987). There is need to train both male and female extension agents on the special needs of the female-headed households, in order to improve their services.

Farming Systems Research (FSR) uses a systems approach to identify technologies that are appropriate for specific locations and farm situations (Collinson, 1985). FSR was developed on the assumption that new technologies were not fitting the local farming systems in which they were being used (Axinn, 1988). In the beginning, FSR tended to perpetuate gender bias. Spring argues that the system ignored gender issues and intrahousehold dynamics (Spring, 1987). Jiggins asserts that the data collected was not disaggregated by gender and that the male dominated enumerators had limited access to female respondents (Jiggins, 1986). The approach was changed to incorporate gender analysis, after studies showed the importance of gender in farming systems. Gender has been found to be pertinent to a comprehensive farming system approach (Jiggins, 1986).

Commodity-based extension systems are organized through the private sector or parastatals. The approach is concerned with a particular crop or commodity and it is highly specialized (Axinn, 1988). The approach is part of the colonial legacy in developing countries. It was used to promote export crop production for European markets (Blackburn & Flaherty, 1994). The approach works through organizations whose managers prefer to work with household heads, who in most cases are men. Hence, the approach does not direct its services to women farmers unless they are *de facto* household heads (Saito, Mekonnen, & Spurling, 1994).

Gender analysis is important in development programs as it considers the role played by both men and women and how they relate to each. Boserup highlighted the need to incorporate women in development activities (Boserup, 1970). She argued that although women were key contributors to agricultural production, their activities were not accounted for in national reports. Since then, awareness has grown as to the importance of understanding women's roles in production and including women in the development process (Feldstein & Poats, 1989).

In many developing countries, extension programs are designed to pay little attention to women. This can be traced to the erroneous assumption that men are the main decision-makers and producers in the agricultural systems. This is compounded by the fact that most agricultural extension agents are men. This discrimination does not occur because women are inferior farmers. Studies have shown that given equal opportunities, women can be as productive and efficient as their male counterparts (Blumberg, 1992; Ostergaard, 1992; Staudt, 1985). Therefore the needs of women farmers must be addressed and there must be improvement of extension services to them. Jiggins suggests that as long as women's role in agricultural production is ignored or underestimated, agricultural production will not improve (Jiggins, 1986). She further states that neglecting gender relations in production leads to inefficiency. The FAO Expert Consultation on "Improving Agricultural Extension Services to Increase Food Production in Africa" suggests on page three that

> ...the agricultural extension services in Africa should promote and enhance adoption of technical innovations suitable to small male/female farmers with a view to increase food production (and) ...the extension systems in Africa should pay special attention to the key role played by women and youth, since they are the major producers of food, and attempts (sic) to satisfy their basic socioeconomic as well as technical needs (Gill, 1987).

It is evident from the literature reviewed that extension systems do not adequately address gender issues in agricultural production. On the other hand, gender variables have been shown to be important considerations in development. It is in this context that the gender training program is conceived. The proposed program will address the issue of how gender can be integrated into extension in Kenya thus contributing towards improvement of extension services.

Statement of the Problem

The Kenyan Ministry of Agriculture uses the Training and Visit system of agricultural extension. The T&V system has a rigid, hierarchical, top-down approach with little or no participation of the stakeholders. In addition, it has been found that the system does not meet the needs of women farmers (Axinn, 1988; Due et al., 1987; Howell, 1982; UNDP, 1991). The Kenyan Ministry of Agriculture has a home economics branch that works with women farmers in groups. While visiting women farmers is a step in the right direction, the home economics approach is discriminatory and is neither cost effective or sustainable. Although increasing the number of women farmers reached by extension, it ignores the women's major role in agricultural production and other aspects of the food system.

Surveys by Women's Agricultural Productivity in Africa (WAPIA) produced evidence that Kenyan extension agents visit more of the male-headed households than the female-headed households (Saito et al., 1994). The WAPIA surveys found that there are a number of female farmers who prefer male extension agents. The same surveys showed that an increasing number of extension agents wished to work with women farmers. This inclination was attributed to the fact that women are more willing to adopt new technologies than their male counterparts and are the main implementers of the practices. However, they are inhibited by the fact that they do not have control over the production resources.

Agricultural extension agents who work with female farmers disregard the circumstances under which female farmers work, hence are not able to serve the farmers effectively. This has been attributed to the fact that the extension agents lack an understanding and knowledge about gender roles and responsibilities. Thus, the male extension workers do not consider special conditions under which women farmers operate. There is no apparent articulation of the relationship between gender roles in agricultural production and extension.

Purpose

The extension system in Kenya provides discriminative and unsustainable services to women farmers. The mainstream extension services do not fully involve women farmers; nor do extension agents consider the gender roles and responsibilities of the clientele when planning extension programs. This has implications for the success of extension programs. Programs are either not implemented or do not reach the intended persons.

To be able to fully integrate women farmers into mainstream extension, extension agents need skills, knowledge and appropriate attitude on how to plan gender-inclusive programs, enabling them to plan extension programs using a gender approach. Extension agents must be trained in incorporation of a gender dimension into extension programs. Extension personnel (both men and women) must learn to appreciate and understand roles played by different household members. Through training, they can acquire knowledge and skills on how to address women farmer's needs. Eventually, effective training has the potential to prepare extension workers so that they can translate the knowledge and skills into practice by planning and implementing gender-inclusive extension programs. The goal of the training will be to improve extension services through integrating women farmers into mainstream extension services. It is on this basis that a gender training program is proposed for consideration and adoption by the Ministry of Agriculture extension personnel.

Methods

The proposed gender training program will be conducted in a participatory way, combining theory and practice. It will learner-centered with the participants managing and sharing responsibilities with the trainers, utilizing experiential learning. The experiential learning model emphasizes "the process of learning as opposed to just behavioral outcomes" (Kolb, 1984). Knowledge is derived from the learner's experience. Kolb states that new knowledge, skills, and attitudes are achieved if learners have concrete experience, reflective observation, abstract conceptualization, and active experimentation abilities. Trainees will be provided with opportunities to form and test abstract concepts, a process that combines theory and practice. Participants will be involved in classroom and field activities, a process that encourages practice related to what they will study in the classroom. The proposed training program will be based on a philosophy of learning by doing. Participants will take an active role, with trainers acting as facilitators to direct the program.

Results

A training program will be designed for the Ministry of Agriculture extension agents. The training program will be implemented in four training phases and one evaluation phase. Each phase will be conducted for a different group of extension personnel. Training details will be varied to match work the personnel perform in the Ministry of Agriculture. To be effective, training must be backed by change in the Ministry of Agriculture's extension policy and operational structure.

Participants in the proposed training program will:

- Understand and articulate the gender variables in agricultural development, thereby demonstrating gender awareness and sensitivity.

- Use the gender variables to undertake gender analysis and diagnosis in agricultural development, thus demonstrating knowledge and skills in using gender planning tools.

- Use the gender planning tools to integrate a gender perspective into their extension programs and projects, thus translating the knowledge and skills into practice.

Phase One

To be effective, training must be backed up by change in the Ministry of Agriculture's extension policy and operational structure. Phase one training will prepare senior officials of the Ministry to institute policy change in the Ministry, helping them to understand the magnitude and urgency of the problem. In addition, participation by senior officials will increase the likelihood of the Ministry of Agriculture's commitment to the program, sensitize officials, and create gender awareness. Some field-level officials will be involved in this phase to provide a practitioner perspective. Phase one training will be implemented over a three-day period.

The trainers will provide a brief clarification of gender concepts and their importance in development, helping participants understand the purpose of gender training and its relationship to development. The participants will consider gender versus sex, as a way to clear misunderstandings. They will learn that gender is a social construct, determined socially and psychologically, whereas sex is determined by biological and physical conditions. To gain understanding of gender roles, responsibilities, and work patterns, the participants will identify differences in work patterns of women and men. Issues emerging from this exercise will reveal time worked, characteristics of tasks, and roles, and needs of men and women. To apply gender approaches to Ministry of Agriculture's policies, participants will be introduced to concepts of planning and development, and other tools used in gender diagnosis and analysis. Participants will also learn about the rationale for gender planning and its methodology.

Phase Two

The second phase of the proposed training program will focus on extension agents from district headquarters and below, because these agents have responsibility for implementing field extension programs and in direct contact with farmers. Their training will be more intensive, providing tools for performing the intended tasks of implementing gender-inclusive extension programs. Phase two will last for eight to ten days. The objective of it is create gender awareness and provide participants with skills and knowledge in gender diagnosis and planning. It will cover all phase one activities, building on them with additional content.

Participants will discuss different approaches to integrating women into development and how these approaches have addressed gender needs. Approaches to be discussed will include welfare, equity, antipoverty, efficiency, and empowerment. This activity will provide the participants with an opportunity to analyze the appropriateness of policies to gender needs. They will discuss and apply gender planning tools to selected Ministry of

Agriculture projects, providing them with a chance to identify roles on which the project focused and needs met through the projects. Participants will visit projects to classify these projects using gender policy approaches and planning tools, putting in practice what they will have studied in class. At the end of the field visit, participants will reflect on their experience as they plan their own gender-inclusive extension programs.

Phase Three

Participants, selected from those who will have completed the second phase training, will undergo a one-week training to become facilitators. Phase three participants will practice skills of facilitation and production of materials for gender training. Participants will acquire the skills and knowledge necessary to conduct gender training. They will learn various training strategies and identify and appropriate strategies for different audiences, discovering purposes and components of gender training strategies. Participants will discuss training objectives, consider training audiences, analyze when to conduct training, explore who should provide training, and other related topics. They will learn to develop training objectives and conduct training using a variety methods and media. Discussions, learning process approaches, case study methods, and role plays will be practiced. At the end of the third phase, each of the participants will develop a tentative training strategy for her/his respective district.

Phase Four

At the end of the third phase, participants will form district training teams to conduct training for personnel in their respective districts. The objective of phase four is to create gender awareness and provide extension personnel in the field with skills and knowledge on gender diagnosis and planning. The district teams will plan training strategies for phase four that will take six to eight weeks depending on the personnel size in the districts. Phase four training will be identical with phase two.

Evaluation Phase

Formative evaluation exercises will be conducted at the end of each training day and at the end of each training phase. At the end of the training day, the participants will fill out a form to indicate whether they have benefited from the day's session and the degree to which their expectations were fulfilled. The "mountain evaluation", which utilizes a mountain metaphor to show how far the participants have climbed in fulfilling their expectations, will be used (Williams, 1994). The 'trio evaluation', which evaluates training content, identifies areas that need further work and reminds participants of what the training has covered and questionnaires will be used at the end of each phase (Williams, 1994).

In addition to the formative evaluation, a summative evaluation will be undertaken at the end of phase four of the training. It will be used to assess attainment of program objectives and determine effectiveness of the training program.

Conclusion

In Kenya, few women benefit directly from mainstream agricultural extension programs. Most of the agricultural extension agents are men working mainly with male household heads. There is need for change; extension should provide services to all farmers irrespective of their gender. To enable extension agents to plan gender inclusive programs, a gender training program is proposed. It will train extension agents on how to incorporate a gender dimension into extension programs. The proposed program will be conducted in a participatory way combining theory and practice. For sustainability, gender training should be made part of curricula at all institutions where agricultural development personnel are trained.

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INSERVICE TRAINING NEEDS IN APPROPRIATE TECHNOLOGY AS PERCEIVED BY INTERNATIONAL AGRICULTURAL DEVELOPMENT WORKERS

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INTRODUCTION

Finley and Price (1994) observed that "every nation desires to attain a higher standard of living for its people" (p. 275). To accomplish this goal, nations must make wise use of both human and material resources (Finley & Price).

According to Seesang (1983), "the objective of agricultural development is to increase the efficiency of agricultural production for a growing population" (p. 28). In addition, agricultural development aims to improve the quality of life of a nation's citizens (Bunch, 1982). Therefore, increasing the effectiveness of agricultural development efforts is important to the life of a nation and to the world at large (Finley & Price, 1994; Wennergren, Plucknett, Smith, Furlong, & Joshi, 1986).

One area of growing interest in the development field is appropriate technology. Technology is "the systematic application of science and other organized knowledge to practical tasks" (Allo & Schwass, 1982, p. 59). When technology is appropriate, it "meets a felt need, is simple to teach and understand, and uses resources poor people already have" (Bunch, 1982, p. 97). Because appropriate technology is aimed at increasing the efficiency and effectiveness of agriculture and related areas (Bunch), developing countries have a "high potential to respond to new technology" (Wennergren et al., 1986, p. 7). In addition, agricultural production is greatly impacted by both the quality and quantity of a nation's human resources (Wennergren et al., 1986). Maximization of human potential is key to the overall development of a country (Yen & Feliciano, 1967). According to Wennergren et al., "studies further suggest that the more education and training farmers have, the more likely they are to adopt new agricultural technologies" (p. 8).

Agricultural development workers are a key component of the development process (Bunch, 1982; Finley & Price, 1994). For example, in carrying out technical assistance programs for developing countries, the U.S. Agency for International Development (USAID) and other U.S. institutions have placed consultants, researchers, teachers, extension workers, trainers, program planners, and others in developing nations around the world (Seesang, 1983). The overall impact of their work has been substantial (Finley & Price).

Seesang (1983) observed that appropriate inservice training is needed to maximize the effectiveness of agricultural development personnel. He also noted that training is almost always built in to international development projects because of its importance to the success of such projects. In the same light, Coombs and Ahmed (1974) recommended "more frequent and relevant inservice training" (p. 240) as a means of improving agricultural extension efforts in developing countries.

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Borich Needs Assessment Model

One type of assessment model that can be used in training situations is the Borich Needs Assessment Model (Barrick, Ladewig, & Hedges, 1983; Borich, 1980). This model attempts to identify the gaps between actual and desired performance, and consists of three distinct phases: goal setting, performance measurement, and discrepancy identification (McKillip, 1987). In this model, goal setting refers to "identifying what ought to be," performance measurement refers to "determining what is," and discrepancy identification refers to "ordering differences between what ought to be and what is" (McKillip, p. 20)

According to Borich (1980), a central characteristic of this model is that it is self-evaluative, relying upon the respondents' judgments about their own performance. The underlying assumption is that the respondents can best judge their own performance and rate themselves objectively.

A major benefit of the model is that it can be adapted to meet various organizational needs (Borich, 1980). Borich developed the model for use with teacher trainers, to gather "immediate feedback on the effectiveness of program experiences and materials" (Borich, p. 42). Similarly, the model has been used to determine educational and training needs of vocational agriculture teachers (Barrick, Ladewig, & Hedges, 1983; Newman & Johnson, 1994) and extension personnel (Randavay, 1989; Waters & Haskell, 1989).

Various studies have cited a lack of sufficient inservice training as one reason why both development workers and projects have failed to achieve their potential (Allo & Schwass, 1982; Coombs & Ahmed, 1974; Seesang, 1983). Seesang (1983) recommended that further study be done regarding training needs of international agricultural development professionals in various positions and areas of the world. Such feedback is needed by those who train agricultural development workers.

Research Questions

This study addressed the following questions with regard to perceptions of international agricultural development workers in attendance at the 1995 international agricultural conference held by the Educational Concerns for Hunger Organization (ECHO), North Fort Myers, Florida:

(1) What competencies in specific areas of appropriate technology do agricultural development workers perceive are needed by agricultural development workers?

(2) What level of competence do the development workers perceive they currently possess in specific areas of appropriate technology?

(3) Based on statistical analysis of perceived competencies, in which areas of appropriate technology do the development workers have the greatest training needs?

PROCEDURES

This study utilized a descriptive-survey research design limited to participants at the 1995 Agricultural Missions Conference held October 30-November 2 at the Educational Concerns for Hunger Organization (ECHO), North Fort Myers, Florida.

The 1995 ECHO Conference brought together those involved in international agricultural development for a four-day workshop on development-related innovations. Conference participants therefore represented a broad cross-section of those involved in non-profit type development work. Included among the participants were grass-roots community workers, agricultural missionaries, university faculty and staff, researchers, consultants, students, and other persons. Based on their presence at the conference, these individuals were believed to fall into three categories: those currently involved in overseas development work; those who had plans to be involved; and those who functioned in some form of support capacity within the United States.

Instrumentation

Data was gathered using a questionnaire developed by the researchers. Section one requested information on the personal characteristics and backgrounds of the conference participants. This information included country of current service, age, present educational level, status of involvement in international agricultural development programs, present position in international work, world regions served during career, total number of foreign countries served, and total years of service. This section was adapted from an instrument used by Seesang (1983).

Section two collected information on the self-perceived professional competencies of the participants in twenty-one topics related to appropriate technology. This section utilized a discrepancy format (needed and possessed) scale ranging from 0-4 to measure the perceptions of the respondents in each of the items. As such, this section was an adaptation of the Borich Needs Assessment Model, in which both current and desired competencies are examined and combined in a mean weighted discrepancy score to derive a list of ranked needs (Borich, 1980).

Section three, the final section in the survey, requested respondents to write down other development-related topics they felt were important. They were asked to rate their needed and possessed competency levels for these constructs in the same manner as in section two. These self-identified constructs were later tallied and ranked by the researcher.

Content validity of the instrument was established in two ways. First, noted sources were used to develop the questionnaire. Second, the instrument was reviewed by a panel of three experts in the field of agricultural and extension education at Mississippi State University.

The instrument was pilot-tested on seven staff members at the Institute for Hunger Education and Resources Training (HEART), located near Lake Wales, Florida. The purpose of the pilot test was to verify face validity of the instrument, as well as to establish test-retest reliability (coefficient of stability) (Price, 1972). The test was given on October 9, 1995, and then again on October 19, 1995. Spearman correlations were calculated for each item on the test to verify reliability. Correlations ranged from 0.47 to 1.00. These correlations were converted to Fisher's Z scores, averaged, and then converted back to derive an overall correlation of 0.86 (Ferguson, 1976). The instrument was also revised based on direct input from the pilot study group.

Data Collection

The survey was administered on-site at the ECHO Conference on November 2, 1995. Seventy-four conference participants returned the questionnaire, yielding an estimated response rate of 80%.

Data Analysis

The statistical discrepancies between competency levels needed and possessed were derived for each item in this section using the formula: (N-P) x N, where N = "needed" and P = "possessed". Once discrepancies were determined, scores were ranked by construct to determine priority training needs (Borich, 1980; Newman & Johnson, 1993). Additional competency areas given by the respondents in section three were tallied and ranked.

FINDINGS AND INTERPRETATION

Biographical Data

The average survey respondent was 40.78 years old. At the time of survey, he or she had an average of 7.76 years of experience in an average of 3.25 countries outside of the United States.

Individuals were currently serving in 25 countries. Of these countries, 19 are listed among the 88 low-income food deficit countries (LI-FDCs) identified by FAO (Raymond, 1995). The average number of countries served by the participants was 3.25. The minimum number of countries served was 0, and the maximum was 30.

Participants were asked to indicate their total time of involvement in international development outside the U.S. Sixty-three of the respondents (85.1%) indicated overseas experience. The average number of years of service was 7.76, and the greatest number of years was 34. Fifty-five (75.3%) respondents indicated they were currently participating in international agricultural development programs.

Respondents were asked to report their present educational level. Bachelor's degree holders represented the highest number of participants, at 45.2%, followed by master's degree holders, at 24.7%.

The nine doctoral degree holders consisted of seven with academic doctorates, one with a doctorate in dentistry, and one with a doctorate in veterinary medicine. Respondents to the "Other" category included those who had received a high school education, those whose work on a bachelor's degree was in progress, and those with other forms of training. One respondent indicated receiving formal training in midwifery and nursing.

Training Needs

Using the Borich Needs Assessment Model, the statistical discrepancy between competency levels needed and possessed was derived using the formula: (N-P) x N, where N= "needed" and P= "possessed." Individual training areas were then ranked to determine priority training needs in each construct. Tables 1 through 3 contain the mean weighted discrepancies, the mean "needed" and the mean "possessed" for each of the training areas in the three constructs.

Table 1

Intensive Gardening Construct: Training Areas Needed, Possessed, and Mean Weighted Discrepancies

Training Area	Mean Weighted Discrepancy	Mean Needed[a]	Mean Possessed[b]
Management of Fruit Crops (n=65)	5.585	3.754	2.423
Medicinal Uses of Plants (n=64)	5.313	3.134	1.868
Mgt. of Vegetable Crops (n=63)	4.810	4.172	3.145
Agroforestry (n=63)	4.683	3.667	2.567
Integrated Pest Management (n=64)	4.391	3.600	2.614
Small Plot Irrigation (n=63)	4.175	3.750	2.838
Natural Fertilizer Use (n=64)	3.063	3.831	3.157

[a] Mean based on 1 = none needed, 2 = low level needed, 3 = medium level needed, 4 = high level needed, 5 = very high level needed.

[b] Mean based on 1 = none possessed, 2 = low level possessed, 3 = medium level possessed, 4 = high level possessed, 5 = very high level possessed.

Table 2

Animal Husbandry Construct: Training Areas Needed, Possessed, and Mean Weighted Discrepancies

Training Area	Mean Weighted Discrepancy	Mean Needed[a]	Mean Possessed[b]
Tropical Feedstuffs for Animals (n=61)	5.213	3.603	2.406
Poultry Production (n=62)	4.145	3.587	2.682
Fish Production (n=63)	4.127	3.156	2.106
Goat Production (n=62)	3.919	3.286	2.400
Cattle Production (n=63)	3.794	3.203	2.379
Swine Production (n=62)	3.548	3.016	2.169
Rabbit Production (n=60)	2.133	2.968	2.585

[a] Mean based on 1 = none needed, 2 = low level needed, 3 = medium level needed, 4 = high level needed, 5 = very high level needed.

[b] Mean based on 1 = none possessed, 2 = low level possessed, 3 = medium level possessed, 4 = high level possessed, 5 = very high level possessed.

Table 3

Environmental Technology Construct: Training Areas Needed, Possessed, and Mean Weighted Discrepancies

Training Area	Mean Weighted Discrepancy	Mean Needed[a]	Mean Possessed[b]
Storage of Harvested Crops (n=63)	5.556	3.719	2.463
Food Preservation (n=63)	4.921	3.667	2.627
Water Purification (n=64)	4.813	3.662	2.667
Erosion Control Practices (n=63)	4.190	3.939	3.061
Water Power Applications (n=64)	4.031	3.000	2.030
Wind Power Applications (n=63)	3.381	2.615	1.896

[a] Mean based on 1 = none needed, 2 = low level needed, 3 = medium level needed, 4 = high level needed, 5 = very high level needed.

[b] Mean based on 1 = none possessed, 2 = low level possessed, 3 = medium level possessed, 4 = high level possessed, 5 = very high level possessed.

Respondent-Identified Constructs

The final section of the survey requested respondents to list other competency areas they felt were important but that were not included in the questionnaire, and to rate those competencies. Table 4 depicts respondent-identified competencies with a frequency of two or more; these have been grouped into six categories based on similarities of subject matter.

Discussion

Several observations can be made regarding this study:

1. The use of the Borich Model had an effect on the final ranking of survey topics. A comparison of the rankings based on the mean weighted discrepancy scores with the rankings based on importance and competence showed differences in rankings. This finding is similar to findings by Barrick, Ladewig, and Hedges (1983), Newman and Johnson (1994), and Waters and Haskell (1989), and attests to the value of the Borich Needs Assessment Model in prioritizing training needs.
2. Other factors may have shaped the outcome of the study as well. For example, the respondents differed according to length, type and location of service. Therefore, their responses were guided by the location-specific nature of and relative importance placed on specific appropriate technologies.

Table 4

Other Competency Areas Identified by ECHO Conference Participants

Competency Area	Frequency
1. Human Relations Skills	
Communication skills (interpersonal/intercultural)	6

Management of people/administrative skills	5
2. Community Development Skills	
Development concepts/approaches	6
Resource utilization/facilitation skills	2
3. Environmental Technology Skills	
Water supply (well drilling, pumps)	4
Vehicle/tractor repair	3
Construction skills (e.g., welding/woodworking)	2
Seed collecting and preservation	2
Transportation modes/devices	2
4. Intensive Gardening Skills	
Gardening systems	2
Nursery production	2
5. Business Skills	
Marketing processes	2
Knowledge of value-added products	2
6. Teaching Skills	
Teaching skills/alternative teaching methods	2

Recommendations

The following recommendations are made based on findings in this study:

ECHO and other training organizations providing instruction in appropriate technology should consider incorporating the following areas into their training programs: management of vegetable and fruit crops, medicinal uses of plants, tropical feedstuffs for animals, poultry production, fish production, storage of harvested crops, food preservation, and water purification. These areas were those in which international agricultural development workers attending the ECHO conference had the highest training needs.

Individuals interested in receiving training in appropriate technology should consider training in the following areas: management of vegetable and fruit crops, natural fertilizer use, tropical feedstuffs for animals, poultry production, goat production, erosion control practices, storage of harvested crops, and food preservation. These areas were those which international agricultural development workers attending the ECHO conference perceived to be most needed in their individual work overseas. Workers who do not have these competencies should consider making arrangements to obtain them.

Study of extension methods and community development approaches should be considered for incorporation into training programs as well. These areas received relatively high rankings among the respondent-identified competencies in this study.

Future workshops and conferences of this nature should incorporate practical demonstrations of specific appropriate technologies, for learning effectiveness.

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Session J **Technology Transfer**
Session Chair - Edward Ruddell
Jefferson Room

TITLE: Joint Focused Programming for Enhanced Information Delivery
AUTHOR: Dunstan A. Campbell, U.W.I Outreach Lecturer, St. Lucia
DISCUSSANT: William Rivera

TITLE: The Changing Role of Extension in Technology Transfer
AUTHOR: Burton E. Swanson, University Of Illinois at Urbana-Champaign
DISCUSSANT: William Rivera

TITLE: Determinants of Opinion Leader Effectiveness in Information Transfer
AUTHOR: Gustav H. Duvel, University of Pretoria
DISCUSSANT: William Rivera

TITLE: The Attitudes and Patterns of Farming in Trinidad
AUTHORS: Wayne G. Ganpat, University of the West Indies
Deokee Bholasingh, Ministry of Agriculture Land and Marine Resources, Trinidad
DISCUSSANT: Mary Lou Carlson

Joint Focused Programming for Enhanced Information Delivery

By

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1.0 Introduction

In the Caribbean like most developing countries, the traditional extension approach is used in the delivery of extension education services to farmers. Over the past two decades the Governments of the Eastern Caribbean States in collaboration with the University of the West Indies (UWI), the Mid West Universities Consortium for International Activities(MUCIA) and the Caribbean Agricultural Research and Development Institute (CARDI) embarked on two separate projects - The Caribbean Agricultural Extension Project (CAEP) and the Agricultural Research and Extension Project (AREP). These projects were meant, among other things, to strengthen research/extension organisations in the respective countries and to put in place lasting structures for research /extension linkages. Coming out of these Projects are the CARDI's FSRD methodology, the Farm and Home Management Extension Approach, the Task Force Approach and Joint Focused Programming. These structures are not mutually exclusive; in fact, they follow a developmental process each building on the strength of the other. This paper traces the processes which led to Joint Focused Programming, describes the processes involved and examines its impact on the delivery of services of the farming community.

2.0 Caribbean Agricultural Extension

Caribbean Agricultural Extension operates in an environment of dualism. On the one hand there is a commercial sector geared for export and the other hand an emerging commercial sector geared towards local food production. The export sector is reasonably well organized with well established research and extension. The organisation and management of this sector is under the control of statutory bodies. The emerging commercial sector is a little less organised and depends mainly on the Ministry of Agriculture for agricultural information.

In recent years this arrangement has been questioned mainly due to the fact that when one examines the figures of Government expenditure on extension and export earnings there seems to be some cause for concern. Most of the foreign exchange earnings come from the sector which is not supported by government expenditure and local food sector was not meeting local demands, as reflected in the rising food import bill. The problem has been, in the main, identified as diffusion of effort on the part of government's extension officers. Whereas the export sector managed by statutory bodies focused on one commodity, the Ministry of Agriculture extension staff dealt with everything, thus making their impact less visible. Coupled with this low impact was the low morale brought on by a myriad of problems which existed among government extension staff.

In 1980 MUCIA in collaboration with the University of the West Indies conducted a prefeasibility survey to document the problems facing extension organisations in the Eastern Caribbean. This lead to the Caribbean Agricultural Extension Project (CAEP) 1983-1989. CAEP targeted the strengthening of extension organisations. Its work focused on programme planning and implementation, communication support systems, and the development and strengthening of farmers organisation

CARDI on the other hand with funding from USAID was developing Farming Systems for Caribbean Agriculture. Both organisatioins were in fact developing systems for utilization by extension. With the coming on stream of AREP it was envisaged that research and extension would function symbiotically. This did not happen. It was therefore necessary to explore other means to achieve this end. Joint Focused Programming is one such means. In the meantime public sector extension in the Eastern Caribbean continued to operate in a disorganized manner.

It was common to find that within any one extension organisation several different extension approaches were used by front line officers. Sandman (1990) in her analysis of extension organisations in the Eastern Caribbean identified four basic approaches to programme development. These were:- transactive, personal, institutional and clientele. The transactive approach was the most common. She attributed this to pressures from the clientele, superiors or coordinating agencies, problem sources and/or resources. There was also a lack of commitment to programmes because they saw them as someone else's programme (Andrews 1975, Campbell 1978, Barker 1981 and Henderson and Patton 1985).

The task of developing an efficient programming approach was therefore to address the problems of commonality and focus. The CAEP Project directed a significant amount of its resources in testing and developing the SONDEO or Rapid Rural Appraisal Methodology. This methodology was chosen because it provided for the utilization of professionals from several disciplines and it gave a more holistic approach to problem identification and solution finding.

The problem arose with continuity after the SONDEO. An institutional framework for the utilization of the SONDEO recommendations and programme elements was not in place. The teams which worked on enriching problem identification and solution finding went their separate ways after the SONDEO exercise.

In 1989 the Agricultural Research and Extension Project (AREP) which was funded by UASID and implemented by the University of the West Indies and CARDI had as one of its objectives to institutionalize the changes made in extension organisation and management under CAEP and specifically those related to research extension linkage. To note there were three approaches which came out of CAEP. These were the Farm and Home Management Extension Approach, the Task Force Approach and Joint Focused Programming. These approaches all use farming system concepts and rely on findings of several regional studies (Barker et al 1986; Campbell 1986; and Dolly 1990). This paper focuses on Joint Focused Programming and in so doing briefly shows how the other approaches were developed and used in the varying context in Caribbean Agricultural Extension.

3.0 Joint Focused Programming

Before Joint Focused Programming Ministries of Agriculture Extension Divisions in the Eastern Caribbean and in other Caribbean territories developed work programmes in isolation to the other units within their Ministry and without direct involvement of collaborating institutions. Mention of involvement of collaborating institutions and units is usually made in Extension's programme but in most cases without the commitment of those bodies. In fact, the very said institutions and units develop programmes which are usually not in tandem with extension's work programme. The result being that the involvement of these units and institutions is not always forthcoming because of commitment to their own programme.

Joint Focused Programming was designed to address these issues and in addition to assist Ministries to focus on activities which can produce impact. It was also necessary to create the institutional environment or a shift in paradigm for the use of this approach. This is an important difference between this approach and the others developed under CAEP. The other approaches can be implemented without this overall institutional change as will be demonstrated later. In Grenada where the Approach is most advanced Divisions within the Ministry of Agriculture and supporting institutions were given directives by the highest administrative officer within the Ministry, the Permanent Secretary, that their cooperation and collaboration is required and that all programmes within the Ministry must be in sync with the Joint Focused Programme. This was the formal environment which the programme needed to operate successfully.

Programming planning and implementation processes followed the same broad outline as most programme development process - needs assessment, programme development, programme implementation, monitoring and evaluation and feedback - with an important difference, commodity assessment. However the concepts of linkages and focusing were paramount in all stages of the process and Extension's role as a partner in the research extension mix was also highlighted.

3.1 Commodity Assessment

Step one in the process dealt with an assessment of commodities with potential to impact. This assessment was done by a representative group of stakeholders in the agricultural industry. This group included representatives from all units of the Ministry of Agriculture, marketing personnel - both private and governmental, input suppliers, farmers organisations and agricultural supporting institutions The criteria used for the selection of commodities were as follows:-

1. Availability of production technology
2. Availability of cost of production
3. Availability of markets
4. Availability of lands for the cultivation of the commodity
5. Farmers interest in the production of the commodity; and
6. The foreseeable impact: economic, social and environmental.

It is important to get the involvement of as broad a group as possible so as to be assured of the commitment of the key stakeholders; a factor which is essential for the success of any agricultural programme.

The other pathway used in commodity selection was the Task Force Approach. This Approach was first experimented with in the island of Montserrat. Barker (1992) stated that the Task Force Approach arose out of a severe shortage of manpower within the Ministry of Agriculture of that island. The Approach uses multidisciplinary teams throughout the process of problem identification and implementation and is used to move a commodity from the research station to the marketplace. In Grenada the Task Force Approach was used to develop onion production for entering into the programme of focused commodities.

3.2 Needs Assessment

The Rapid Rural Appraisal methodology was used to conduct the needs assessment for the programme. Teams comprising of individuals from the Ministry, supporting institutions and the farming community were drawn up for the exercise of needs assessment. The composition of each team was multidisciplinary and consisted of at least one extension officer. Each team was given a specific region to survey to obtain farmer level problems and solutions.' The farmer list for the region was developed by the extension officers. Farmer selection was done by two means; firstly a random selection was made from the list submitted by extension and secondly a selected number of farmers were chosen based on the commodities selected for focusing. Farmer organisations were also interviewed during the farmers visits. The time frame for the collection of farmer related information spanned from three to five days.

The teams were then recomposed and given the new task of gathering secondary data; for instance marketing, transportation, credit facilities and government support policies and mechanisms

After data collection the teams then gathered in plenary to analyze the information. This analysis allowed for the identification of constraints and opportunities as it relates to the various commodity areas. These areas then formed the basis for the development of work plans for the various units of the Ministry of Agriculture and supporting institutions.

At the needs assessment stage coordinators and technical leaders were selected for each commodity or group of commodities. It was thought that in order to maintain the holistic approach through to implementation someone should be responsible for overseeing and liaising with all the stakeholders during the implementation stage. Because of this important role and given the fact that the workplans being developed were regarded as belonging to the Ministry it was decided that coordinators should come from the Ministry of Agriculture. The coordinators were given the following responsibilities:-

1. To be responsible for developing a project document for each commodity.
2. To liaise with support institutions to obtain timely interventions and data.
3. To provide supporting information to extension re marketing, technology, credit information etc.
4. To liaise with the District/region supervisors in the monitoring of programmes.
5. To liaise with the planning unit to provide data on programme implementation; and
6. To report on programmes to the review committee.

The technical leaders on the other hand were responsible for:-

1. Providing up-to-date information through continuous research and development activities.
2. Developing production guides for use by extension staff and farmers; and
3. Providing leadership in the training of extension staff

We have found that the information gathered during this exercise remained valid for up to five years. We have used this knowledge to develop programmes for periods ranging from two to three years. It meant therefore that an elaborate needs assessment exercise was no longer necessary every year, which meant cost efficiencies. Adjustments in programming was made through the inbuildt system of monitoring and evaluation.

3.3 Programme Development

Programmes were developed using a two tier system. In the first tier the coordinators developed a project for each commodity or commodity group. This project took into consideration the data gathered during the needs assessment stage. In the next tier workplans were developed. The different units/divisions of the Ministry and supporting institutions utilized the data from the project or master plan to develop workplan areas. For instance, extension officers working in a particular district found themselves working on three of the six focused commodities; while in another district the extension officers had to develop workplans for all six commodities.

Work plans covering all of the project areas and activities were developed at the same time, in the same place and by all the units. This was an important difference to what existed. In the past extension officers developed their plans indicating the areas where they needed assistance from the other units. This never worked because the other units in their planning unknowingly utilized the same slot of time for some other activity. It is important that with this new approach that the coordinator double checks to verify that there are no clashes in scheduling. The output of this exercise were plans covering the areas of extension, research and marketing of the focused commodities.

In the case of extension the workplans developed during this exercise represented a significant part of their workload. In the planning process attention was paid to the time allocated to focused activities and non-focused activities. In the Caribbean public sector extension officers still function as rural development agents. In order to fulfill this role time must be allocated for those farmers who are on the periphery of commercial agriculture. The time allocated to focused activities by the other collaborating partners will depend on the commodities selected and their role and function in the agricultural environment. For instance some of the supporting institutions have mandates to do other things not directly related to the Ministry's work programme.

3.4 Implementation

The roles and responsibilities of the different actors were clearly worked out in the implementation stage as the Ministry and supporting institutions put in place an information system to support the focused commodities. A cycle of rotating leadership was developed to assist the implementing agents in their roles and responsibilities. The cycle follows the broad parameters of FSRD. On station research is done with the Research Unit providing the leadership with extension and the farming community participating in the design research parameters. Technologies coming out of the research station are tested on selected farmers holdings with research providing leadership and extension playing an increasing role - this being the takeover stage for extension. Tested technologies are then moved one step further to the demonstration stage where extension provide the leadership and research provide the supporting role. Finally the technologies if proven to be appropriate are then passed on to the wider farming community, again with extension leadership.

One will find that in any situation the entire cycle will not be activated because of the level of the information base of the commodities. However, experiences with commercial agriculture has shown that it is important to maintain an active research and development programme if a commodity is to remain competitive and as a corollary viable and sustainable.

The are a few areas which are worth mentioning with regards to the rationale for assigning leadership roles in the cycle of implementation. Farmers and extension officers involvement in the design of research parameters and in the development of the technologies have proven to be very useful in the utilization of technologies. Farmers and extension officers felt like real partners in the development process. They have indicated that through their support for the programme and their enthusiasm in getting things done. The process also insisted upon extension officers taking control of the demonstration of technologies on farmers holdings and in widespread diffusion. This allowed extension officers to develop their confidence and establish their authority in their district. The team approach to implementation also provided a security framework for improving the support mechanisms to extension. These are important areas of concern for Caribbean agricultural extensionist.

In the implementation stage the Farm and Home Management Extension Approach, one of the Approaches developed under CAEP, was used to work with some focused farmers. This Approach utilizes farming systems concepts to develop farm family plans which are geared to meet farm and family goals. The underlying philosophy in this Approach is that the farm and the farm are related components of the same system; and that decisions taken in one unit will affect the other. This Approach is seen as an important strategy in working with emerging farmers in the focused programme. The Approach becomes less crucial for the highly commercial farms where farming is seen as an investment.

3.5 Monitoring

The team approach was used in monitoring. There were two levels in motoring; the informal level, where the coordinator and staff of a particular district visited sites to get an update of the implementation. The purpose of these visits was to inform the other members of staff within the district on the activities being done in the extension officers constituency. At times visits were arranged to include other districts depending on the programme being reviewed.

The other level was more formal. Visits were scheduled and include persons from the Planning Unit of the Ministry, marketing personnel, the Head of Extension, the coordinators and technical leaders and representatives from the supporting institutions. This group is referred as the Review Committee. The purpose of these visits was to get hands on view of the implementation process, to discuss problems and possible solution with regards to programme activities and to do forward planning.

The involvement of the Planning Unit in monitoring field activities led to increased understanding of the problems of data collection and the need to have timely and reliable data. These visits also brought out the need to have a well manned Planning Unit operating efficiently. It was felt that the Planning Unit should be the command and control centre for Joint Focused Programming activities.

3.6 Evaluation

The Programme had in place formative and summative evaluation. Formative evaluation was done every three months. At these evaluation sessions the coordinators reported to a broad group comprising of persons who were involved with the selection of the focused commodities. Problems brought up at these sessions were dealt with in detail by the Review Committee and other smaller committees depending on the nature of the problems.

The was also a summative evaluation which was done at the end of the programme year. This formed the basis for the development of the following year's programme.

4.0 Lessons Learnt

The five years of using this Approach has taught us many lessons. We have had to make several changes in the processes and mechanisms first utilized. For instance, we have been told by the users that there were too many committees, the functions of which could have been fused. We have since made those changes and are now observing its effectiveness.

In the initial implementation the Planning Unit was not given sufficiently active role in the design of the data to be collected and the monitoring of data; the result being that data when submitted for analysis was found to be in a form not readily imputable by the systems in place at the Unit. Again we have made corrections to this and now the Planning Unit has a role in both the design of projects and monitoring of data collection.

The shift in paradigm was not easy. Many Units and individuals within Units resisted the changes. Some overtly expressed concern about the loss of control, especially financial control. There was also the question with regards to recognition for programme success. In the past the Units took the qudos for programme success; with Joint Focused Programming the team is recognized. Many individuals are still uncomfortable with this; however systems are being experimented to correct this anomaly. One such system is to have radio and television programmes highlighting parts of projects in which different individuals play a role.

Then too there was the problem of getting the international supporting institutions to work together on common programmes. International institutions operate with specific mandates which are not always territory specific; and even though they are specific certain protocols acted as obstacles to effective inter agency collaboration. Working around this was not always easy.

We have also seen that in the initial period of implementation extension officers resisted the process because they felt that their constituency was being overtaken by persons from other Units. We have since been very cautious with the methods of intervening into extension officers constituency. As a rule we now have extension do all the farmer training in his or her constituency. Resource persons are invited if necessary. We have found this to have tremendous impact on extension officers morale and confidence.

Political support for the process is still wavering. Whereas the idea of focusing is accepted there are still uncertainties with regards to this new mandate of combining resources to focus on specific commodities. This concern is most evident in the Extension Unit where extension officers are sometimes asked to perform as the used to before Joint Focused Programming. Should they continue to work with all farmers and all commodities or shift to the new direction of focusing on selected commodities and selected clientele? The Political directorate is not very clear on this; especially when it comes to an election year when votes become the overriding criterion for action.

5.0 Conclusion

Extension in the Caribbean is now being faced with new challenges brought about by the liberation on the world economy. In responding to these new challenges extension must put in place systems which would improve their efficiency. Joint Focused Programming has shown to be an effective approach in addressing some of the problems which face extension - low impact of extension services, strengthening of linkages with research, other organisations, improving the status of extension workers and providing the information to make agriculture more competitive. Given the present institutional arrangements under which the Approach operates there is still the tendency for Units to operate as "kingdoms". There is need to address this issue from the point of redefining the role of the Ministries of Agriculture.

Institutionalizing this Approach will be a test of Ministries preparedness to respond to the changing realities of limited resources and a more aggressive global environment. Then again there is the question of professionals accepting the changes and working towards meaningful and sustainable solutions.

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The Changing Role of Extension in Technology Transfer

Burton E. Swanson[1]

Introduction

The purpose of this paper is to summarize the changing role of extension in technology transfer, including the emerging technologies that may impact the capacity and effectiveness of developing country extension systems in meeting the technology needs of their farmers, especially resource poor farmers. In addition, as the private sector takes on more responsibility for technology transfer in the form of production inputs, then the public extension system will need to focus on those knowledge-based technologies that the private sector will be unlikely to provide over the near-term. The first part of this paper summarizes the changing nature of agricultural technology and its implications for extension systems in developing countries. Then, these implications are discussed in light of how national extension systems may need to realign their approach to technology transfer, including clientele, programs, staffing and new institutional partnerships.

Changes in Agricultural Technology and Its Implications for Extension

The role of extension in technology transfer has changed substantially over the past four decades, with considerable lags and worldwide differences. In large part, these changes have been driven by new developments in agricultural technology and their application. For example, in the 1960's, the United States Agency for International Development (USAID) gave emphasis to building national extension systems. This strategy was built on the faulty premise that agricultural technology from North American and European research institutions could be directly transferred into less developed countries. Therefore, when the so called *Green Revolution* technology emerged from the International Maize and Wheat Improvement Center (CIMMYT) in Mexico and the International Rice Research Institute (IRRI) in the Philippines, then this development pointed to the need for further investments in agricultural research (see Dalrymple and Srivastava, 1994; also, Hayami and Otsuka, 1994). As a consequence, during the 1970s, many donors began investing in research systems that would generate technologies appropriate for agro-ecological and socio-economic conditions of developing countries.

Green Revolution Technology

The Green Revolution technology that emerged in the mid-sixties was a combination of high yielding varieties (the genetic component), plus a concomitant set of broad-based recommendations (crop management practices) that could be widely disseminated within an agro-ecological region. The high yielding wheat and rice varieties quickly spread throughout Asia and beyond, but the complementary set of crop management practices diffused more slowly and unevenly, resulting in the inefficient use of production inputs. Therefore, the introduction of the Training and Visit (T&V) extension approach during the mid-seventies appeared to be well suited for the dissemination of these broad-based recommendations. By 1989, based on the promotion and support provided by the World Bank, nearly 75 countries had adopted the T&V Extension model (Swanson, Farner and Bahal, 1990). Experience has shown that the T&V approach can effectively deliver general extension messages; however, it's top-down management structure and inadequate technical capacity is not well suited to (a) the transfer of location specific recommendations, (b) solving complex technical problems, and (c) disseminating system-based technologies, especially those associated with heterogenous cropping systems in rainfed areas (see The World Bank, 1985).

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System-Based Technologies

Given the lack of progress in disseminating green revolution technologies into rainfed areas, starting in the late 1970's, some agronomists and rural social scientists turned their attention to *farming systems research* (FSR). In theory, this approach was expected to strengthen research-extension-farmer linkages and to develop location specific technology for more complex farming systems. In practice, researchers first described and then began improving different farming systems within an agro-ecological zone (AEZ), especially those cropping systems operated by resource poor farmers in rainfed areas (Brush and Turner, 1987). In some cases, the focus was on intensifying existing farming systems, including interactions between crop and livestock systems. As a matter of practice, however, the more common pattern was to carry out on-farm adaptive research trials with the goal of developing more location specific recommendations, especially for different socio-economic groups of farmers within an AEZ (Byerlee, 1994).

During the 1980s, considerable progress was made in developing FSR methodologies, particularly in carrying out on-farm adaptive research trials (see Byerlee, 1994, and Preston and Leng, 1994). However, the diffusion of location specific technology for most farming systems has not been widespread. This consequence it due to several reasons, including: (a) inadequate FSR capacity within most developing country research systems; (b) the relative high cost of conducting FSR, especially on-farm trials, during a period of declining research budgets; (c) the fact that interdisciplinary FSR is both difficult to implement and not highly valued within the scientific community, and (d) the difficulty of transferring these more complex technologies to different groups of farmers, many of whom have very limited technical knowledge and management skills.

Although research-farmer linkages were strengthened through FSR, especially through the use of rapid rural appraisals (RRAs) and on-farm adaptive research trials, linkages between research and extension remain weak (Byerlee, 1994). One apparent reason for this "disconnect" was due to the widespread adoption of T&V extension by many countries during the 1980s. As a matter of design, most T&V extension systems have inadequate numbers of subject matter specialists (SMSs). In addition, most of these SMSs have insufficient technical training and experience, especially in systems-based technologies. Consequently, the transfer of technologies resulting from farming systems and integrated pest management (IPM) research has been fairly limited (Byerlee, 1994).

Sustainable Technologies

The worldwide recognition of natural resource depletion and environmental degradation, has seen a growing concern for the development and transfer of sustainable technologies in the 1990s (Byerlee, 1994). To some researchers, sustainable technologies imply the development and use of low input technologies that are in ecological balance with production outputs (Tansey and Worsley, 1995). For others, sustainable technologies imply the more intensive use of inputs, in combination with system-based technologies, including soil and water conservation, and improved soil and plant nutrient management or natural resource management (NRM) technologies. In the final analysis, continued population and economic growth will create an expanding demand for more and higher quality food outputs resulting in the expanded use of high input, land and water saving technologies. Therefore, the challenge facing extension in the 21st century will be to disseminate sustainable technologies that will make more efficient use of land, water and production inputs, and that will maintain the natural resource base over time.

Knowledge-Based Technologies

Most sustainable and/or system-based technologies, such as those emerging from FSR, IPM, and NRM research programs, are knowledge intensive. Therefore, farmers need higher level management skills and technical knowledge to successfully adopt these technologies. For this reason, better educated commercial farmers have the capacity to more quickly incorporate these knowledge-based technologies into their farming systems, particularly if it is in their economic interest to do so. The enormous challenge confronting the public research and extension system is how to develop and transfer these location specific, system-based, and sustainable technologies to nearly 1 billion resource poor farmers; farmers who pose the most immediate threat to the natural resource base.

Given that system-based and sustainable technologies are knowledge intensive, it appears essential that national extension organizations stop functioning as a top-down technology delivery system that disseminates broad-based technical recommendations. Rather, extension needs to pursue an approach or model that emphasizes farmer training and the development of technical knowledge and management skills. Such an extension system would be expected to concentrate on teaching crop, livestock, and farm management skills, including the technical knowledge necessary for the adoption of productive and sustainable technologies. In particular, IPM and soil and water management technologies are primarily knowledge-based, therefore, only the public extension system can be expected to disseminate these technologies.

Precision Technology

The next decade will begin to see an integration of farming systems and sustainable research in the form of precision farming technology that is rapidly gaining acceptance in North America. In North America, farmers use both global positioning satellite (GPS) and Variable Rate Technologies (VRT) to accurately apply production inputs across each hectare of their farm. In short, the goal of precision farming is to accurately manage each part of a field based on actual need, rather than managing whole fields or farms based on average needs (Successful Farming, December, 1996). While GPS and VRT have no direct relevance to most developing countries, other tools associated with precision technology, including Geographic Information System (GIS) software and other Decision Support Systems (DSS), such as periodic soil testing and adaptive research findings, appears to be directly relevant for application in most developing countries.

For example, crop management researchers and subject matter specialists (SMS) can work together, using a combination of recently developed computer software programs (GIS/Yield Mapping Software), adaptive research findings, and soil test results from farms within a recommendation domain to specify accurate or precise input levels for different cropping systems within an AEZ. In fact, it would be technically feasible and economically viable for farmers with less that 1 hectare to get precision recommendations for the different crops being grown. In short, precision technology has the potential of enabling all types of farmers to gain more accurate management control over the production inputs that are applied across each hectare of their farms and, thereby, increasing the production efficiency of these cropping systems.

The aspect of precision technology that appears most relevant to developing countries is the use of comprehensive soil test results, on-farm research findings, and GIS/yield mapping software to develop site-specific management (SSM) recommendations for both individual farms and for groups of farms within different recommendation domains of an AEZ. Although decisions about the most appropriate variety or hybrid might be specified for each recommendation domain, the plant population, soil nutrients, and agro-chemicals to be applied can be accurately specified for each hectare of a farmer's field[2], given a particular yield target.

In addition, precision technology is considered to be ecologically friendly, because it adjusts input use to reflect both soil type and crop requirements. For example, farmers can avoid using too much fertilizer and/or agro-chemicals on lighter soils; inputs that might leach into underground aquifers or find their way into streams and reservoirs downstream. Furthermore, by replenishing soil nutrients based on crop output data and periodic soil tests, farmers can avoid long-term soil nutrient mining which is becoming a very serious problem in many Asian countries.

Finally, farmers can decide whether they want to maximum income at higher level of risk, or whether they want to pursue a more conservative yield target with less risk. Therefore, precision technology allows farmers to make informed economic decisions about input use, while reducing long-term environmental degradation. Combined with IPM and NRM technology, precision technology appears to be a logical step toward helping farmers adopt or utilize more cost effective, intensive, and sustainable technology.

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[2] In adopting precision technology practices, most farmers test their soil every four years.

Some tools used in formulating precision or SSM technology could help developing country extension systems overcome their acute shortage of competent technical personnel; SMSs who are needed to support an increasingly complex technology transfer system. As noted above, precision technology has the capacity to generate production recommendations for each hectare within a field or farm; the average size of farm holding for about 90% of developing country farmers. Therefore, with one or two soil tests and an adequate support system, farmers could take direct advantage of adaptive research findings within an AEZ by receiving SSM recommendations accurate for each crop or cropping system being grown on his/her farm at a specified level of risk.

This SSM approach could begin to reduce the inherent inefficiencies and economic costs of promoting broad-based recommendations across an entire AEZ. In addition, it would form the basis for improved research-extension linkages and enable extension make more effective use of its very limited number of crop management specialists. Under this arrangement, SMSs would work closely with FSR, IPM, and other research teams, and with the field extension staff. However, under this new arrangement, SMSs would spend more time teaching farmers about SSM and sustainable technologies, and learning how to further intensify and/or diversify their farming systems.

The task of developing more SSM practices might be undertaken by a research-extension (R-E) service center within each AEZ. Under this arrangement, soil samples would be collected, and production recommendations delivered and explained to farmers by the front line extension staff. The R-E service center, in turn, would carry out adaptive research trials within an AEZ, operate a soil testing facility, and use appropriate GIS software to generate SSM recommendations for different cropping systems being used within each recommendation domain. The actual provision of SSM recommendations to farmers could be made available on a "fee for service" or full cost recovery basis.

Vertically Integrated Systems

A long established approach to technology transfer, that is taking on renewed importance in this period of trade liberalization, is the use of vertically integrated systems for high value commodities within some countries. These systems operated successfully during much of the past century as colonial governments exploited the natural resources and cheap labor in many developing nations to produce high value commodities, such as tea, coffee, sugar, and cotton to meet the requirements of the colonial nation. These vertically integrated production, processing and/or marketing systems are demand driven, however, it is now worldwide competition for specific markets, rather than a colonial government, that will determine the winners and losers. Those countries with the comparative advantage, including agro-ecological conditions and efficient production technology, along with processing capacity and/or marketing arrangements, will be the nations that will eventually dominate these growing export markets.

Developing countries, with relatively cheap agricultural labor, have an important advantage in penetrating rapidly expanding export markets that can both generate foreign exchange and increase farm income. In addition, many high value commodities are labor intensive and have the potential for value added employment. Therefore, nations need to pursue policies that will encourage their farmers to diversify into those high value commodities where they have a comparative advantage (see OECD, 1995). In some cases, the initial R&D work might be carried out by the national research system (for example, see Jarvis, 1994). However, in most cases private companies are far more effective in establishing these vertically integrated systems.

First, private companies better understand the demand structure for different products, especially export markets in Europe, North America and East Asia. Second, private sector firms are far more efficient in establishing the necessary processing capacity and/or market arrangements to exploit this export market demand. Third, these companies are better able to organize a more comprehensive technology transfer system, including input supply, credit, and "contract extension" that will ensure that participating farmers fully utilize the recommended production technology. And, finally, companies are prepared to finance the cost of establishing these vertically integrated systems, including research and extension costs.

Implications for Extension

Intensifying and Diversifying the Farming Systems of Resource Poor Farmers

To more effectively address the food security issue and the need to achieve broad-based, sustainable agricultural development, the technology and educational needs of small farm households must be more adequately addressed. Targeting resource poor farmers with appropriate technology offers an important opportunity for rural households to increase their productivity and incomes, and to slow rural-urban migration. Also, targeting this vast group of low resource farmers can make more efficient use of the land, labor, and capital resources within rural areas.

The most effective means of bringing small and marginal farmers into the market economy and in increasing farm household income is to assist them in intensifying their farming systems and/or by diversifying into high value crop or livestock enterprises. These modifications must (a) be appropriate for the agro-ecological and natural resource conditions of the area, (b) reflect the resource endowment of predominant farm households, and (c) anticipate new and/or expanding market opportunities, including agro-processing. Assisting large numbers of resource poor farmers to intensify and diversify their farming systems, will require an interdisciplinary team effort, involving crop and livestock management specialists, agricultural economists, agro-foresters, horticulturalists, rural sociologists and/or other research and extension specialists who can work together to assess, validate, and transfer these more productive and sustainable farming systems technologies to different socio-economic groups of farmers.

On the other hand, if governments leave research and technology transfer largely to the private sector, then large-scale commercial farmers will be the primary beneficiaries, resulting in larger, more capital and energy intensive crop and livestock systems. In the process, resource poor farmers will be further marginalized, leading to accelerated environmental degradation, deteriorating socio-economic conditions, and rapid rural-urban migration.

Developing and Transferring Sustainable Agricultural Technologies

As the private sector takes more responsibility for production inputs, the public technology system will need to allocate more resources to those technologies that will result in sustainable agricultural development. These technologies include those management practices and systems that will both increase the production efficiency, yet help conserve the nation's soil and water resources. These technologies range from improved conservation tillage practices, to new farming systems, including agro-forestry, that will maintain soil, water and other natural resources. As noted earlier, IPM is another example of a sustainable technology that can reduce crop protection costs and minimize the use of agro-chemicals. IPM technologies are urgently needed since agro-chemicals can threaten the health of farmers, the safety of a nation's food supply, and contribute to long-term chemical degradation of a country's soil and water resources. (see Roling and Pretty, 1997).

In Asian countries, such as India, further expansion of irrigated agriculture will be limited. Therefore, there is an urgent need to improve soil and water management practices to reduce waterlogging and salinization (knowledge-based technology). In addition, more attention is needed in improving the productivity of rainfed agriculture, through improved watershed management and tillage practices; and increasing water use efficiency, especially within irrigated farming systems, to conserve the nation's underground water resources. Finally, soil erosion and soil nutrient mining are having a serious long-term impact on the soil resources of many countries. Therefore, farmers need to be trained in appropriate soil, water, and crop management practices that will reverse these long-term trends. Therefore, research and extension need to allocate more resources to these sustainable technologies that will not be developed and disseminated by private sector companies.

Extension Should Emphasize Technical Knowledge and Management Skills

As noted earlier, both system-based and sustainable technologies are knowledge-intensive, therefore, to achieve farmer acceptance and adoption, implies the need for increased technical knowledge and management skills. In the future, extension should move beyond the simple dissemination of broad-based recommendations, such as those currently being disseminated through approaches such as T&V Extension. Since the importance and value of sustainable technologies may not be readily apparent to farmers, extension will need to organize educational programs that will explain the rationale and importance of these technologies, as well as the necessary management practices necessary to adopt these technologies. In addition, appropriate government policies, including the regulation and pricing of water used for agricultural production, as well as incentives to encourage the adoption of soil and water conservation practices, can help reinforce the dissemination of these sustainable technologies.

Organizing Farmers Into Groups

Most extension organizations in developing countries have done little to help farmers organize into functional groups, such as farmer or commodity associations, or in using these groups to enhance technology dissemination and feedback. There is a growing consensus, that to create a ***demand driven*** technology system, it is necessary to directly involve farmers in identifying problems, establishing priorities, and carrying out on-farm research and extension activities. The most effective mechanism to enable farmers to become a more effective partner in a national technology system is to organize them into farmer associations (FAs). The experience of successful FAs in Asia, Europe and North America is that they must be voluntary organizations, organized around a specific commodity and/or support service, and they must be controlled by the members with the goal of increasing farm incomes and improving the living standards of the participating households (Chamala and Shingi, 1997).

Creating new institutional partnerships

To meet the growing demand for food and to sustain the natural resource base during a period of declining public investment in research and extension, new institutional partnerships will be essential. First, the publicly financed research system will need to cooperate with, rather than compete against private R&D firms. Private sector firms have the resources and comparative advantage to produce and distribute different types of proprietary technologies, such as improved varieties/hybrids and agro-chemicals. In the process, the development, production and transfer costs of these proprietary technologies can be passed along to farmers and ultimately to consumers. Therefore, this private sector component of a national technology system becomes sustainable.

NGOs are becoming important in many developing countries, therefore, they represent an important resource in helping farmers to get organized into functional groups. It is in the direct interest of both research and extension to work with NGOs, and to help farmers become organized into different types of FAs (see Farrington, 1997). These FAs, in turn, can provide invaluable feedback to both research and extension in problem identification, priority setting, and in program implementation and evaluation. In the process, farmers and their FAs can provide invaluable policy support to maintain and even increase public investment in research and extension.

Concluding Comments

The expanding worldwide demand for food, combined with the land and water resource constraints faced by many countries, will result in increased investment in agricultural research and technology transfer. Much of this new investment will come from the private sector and it will be directed toward the development and transfer of proprietary technologies, including genetic, chemical, biological, and/or mechanical inputs. In this emerging institutional milieu, the public sector must concentrate on those research-extension investments that will address serious socio-economic and resource management problems; problems that will not be addressed by the private sector. In particular, they should concentrate on those knowledge and system-based technologies that will enable resource poor farmers to increase their productivity and incomes through more intensive and diversified farming systems. This strategy will help reduce rural hunger, poverty and the socio-economic costs of rapid rural-urban migration. In addition, the public sector must take primary responsibility for developing and disseminating sustainable technologies that will maintain the natural resource base of each country.

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DETERMINANTS OF OPINION LEADER EFFECTIVENESS IN INFORMATION TRANSFER

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ABSTRACT

In this paper the hypothetical assumption is investigated that the largely unsuccessful involvement of opinion leaders as influentials and information intermediaries in development and change strategies can be attributed to their faulty identification. Supportive evidence is provided showing that the classic method of opinion leadership identification tends to identify the knowledgeable person rather than the true opinion leader. Accessibility is identified as a critical dimension of opinion leadership and it is empirically shown that this attribute is negatively correlated with knowledge or expertise, thereby explaining why experts or incorrectly identified opinion leaders cannot be expected to have a significant impact on the diffusion process or the flow of technological information.

1. INTRODUCTION: THE PROBLEM

Focusing communication messages on certain influentials, in the assumption that their influence will come to bear in the further diffusion to and influence of the other members of the target audience, makes sense, especially if personal influence is called for but large numbers or a wide change agent/client ratio make it difficult. Little wonder that the involvement of opinion leaders has been an essential part of most extension strategies aimed at maximizing the information impact (Rogers, 1983; Sen & Bhowmik, 1970; van den Ban, 1981). Even the diffusion theories making provision for a two- or multi-step flow of information imply a key role for opinion leaders or information intermediaries (Parent & Lovejoy, 1987). These so-called opinion leaders have been termed information leaders, gate keepers, taste makers, decision clinchers, energizers, influentials , etc. (Rogers & Cartano, 1962 and 1982; Jones, 1964). They may imply slightly varying specific functions but can, within the broader concept of "influence", be regarded as synonymous, but as informal leaders are clearly distinguished from the formal leaders.

However, in spite of the eminent logic and obvious rationale behind such opinion leader orientated strategies, there is little evidence available regarding their success. As early as 1963 Lionberger found that over 40 percent of major influences leading to the adoption of farm practices could be attributed to opinion leaders. Rogers (1983) in his literature overview refers to only three studies having a positive correlation between successes achieved by the change agent and the extent to which they had worked through opinion leaders. More recent evidence suggesting that the "trickle-down" of information and influence did not occur to a significant extent has been provided by Chege *et al.* (1976) and Lipton & Longhurst (1985). Parent & Lovejoy (1987) also come to the conclusion that the influence of opinion leaders is grossly over-estimated.

A possible cause for the disappointing influence of opinion leaders is that the identification of the opinion leaders could have been unreliable and erroneous. This leads to the question as to what are the most important determinants of opinion leader effectiveness.

2. THE PURPOSE

The purpose of this paper is an investigation into the reasons for the limited influence of opinion leaders in change and development strategies and to identify the main determinants of opinion leader effectiveness, especially as far as competence and accessibility is concerned. The hypothetical assumption is that the cause of the disappointing influence of opinion leaders is their unreliable or incorrect identification, because of an overemphasis of knowledge or competence.

3. RESEARCH PROCEDURE

The study was conducted among farmers who had been used as respondents in a previous study on the acceptability of goat farming (Marincowitz, 1985), because of time and cost considerations. In this way already available background information could be used without having to collect it at substantial costs.

All available farmers of the original survey group (60 goat farmers and 40 non-goat farmers) were included in the study. However, because of certain availability demands enforced by a very limited and specific survey time, it was eventually only possible to interview 42 respondents, implying a final sample of some 30 percent.

To further save time and costs, group interviews (not exceeding five respondents) were made use of. This eliminated the confrontational situation between interviewer and respondent to a large degree and also facilitated a relaxed atmosphere conducive to providing reliable answers. Interaction between respondents was only allowed in so far as it contributed to an understanding of the questions, criteria or scales.

The identification of quasi opinion leaders, assumed to be the knowledgeable rather than the influential persons, was conducted by requesting respondents to nominate the persons whom they would consult with regard to the various branches of farming. In a subsequent question they were asked, regardless of their previous nomination(s), to distinguish between the experts (knowledgeable persons) and those whom they actually consulted. The nominated persons, who tended to vary from respondent to respondent, were assessed by respondents in respect of friendship, accessibility and expertise (relative to their own). Provision was also made for determining deliberate and coincidental consultations.

4. RESULTS

Whether and to what degree opinion leaders are confused with the mere knowledgeable or competent individuals of a community, can be concluded from a comparison of the different types of nominations. These are summarized in Fig. 1 and are based on questions aimed at (i) identifying persons who respondents would consult (quasi opinion leaders), (ii) persons whom the respondents regard as experts (experts) and (iii) persons who are being consulted or have been consulted (opinion leaders).

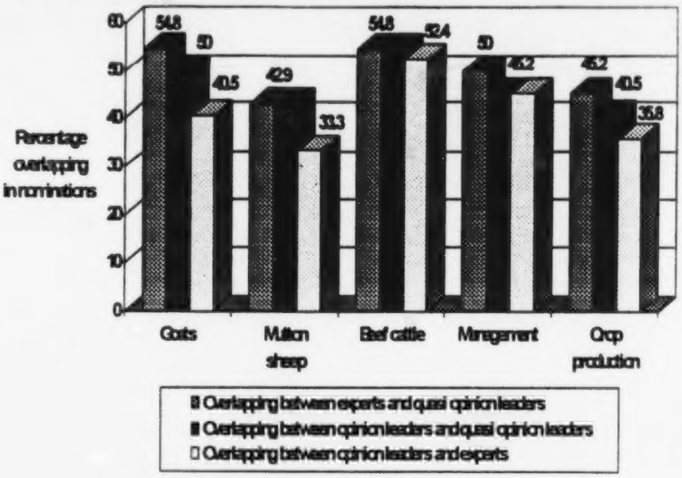


Fig. 1 The overlapping of respondents' nominations of quasi opinion leaders, experts and opinion leaders

The assumption is that, if respondents are inclined to nominate an expert rather than an opinion leader, the overlapping between experts and quasi opinion leader (a) will be greater than in the case of opinion leader and quasi opinion leader (b). In general this seems to be the case, although the differences are not all that big, or even absent in the case of mutton and beef farming. The latter are, incidentally, the most important enterprises with perhaps a larger number of experts and consequently a smaller difference between individuals with knowledge and with influence.

The fact that the differences are not more pronounced may be ascribed to the fact that people who have been consulted, namely the opinion leaders, could also be regarded as experts. This is confirmed by the finding that the overlapping between experts and opinion leaders, although lowest, is still relatively high (average 41,4%). Nevertheless, these findings confirm the necessity of distinguishing between experts and opinion leaders, since an unqualified question as to whom the respondent would consult, tends to identify the expert rather than the person actually consulted (i.e. the opinion leader).

The observation that opinion leaders - when incorrectly identified and thus mistaking experts for opinion leaders - have not exercised the wished for diffusion impact, may be ascribed to their inaccessibility or insufficient accessibility. Generally, expertise or competence is widely regarded as one of the most important dimensions of credibility (Rogers, 1983). However, the flow or diffusion of information is unthinkable without accessibility between follower and the so-called opinion leader. Van der Wateren's (1987) findings confirm this presumption, namely, that accessibility, both physical as well as psychic, is essential for the establishment of a consultative relationship. Seen against this background, it is expected that the expert is less accessible than the person who is consulted viz. the opinion leader.

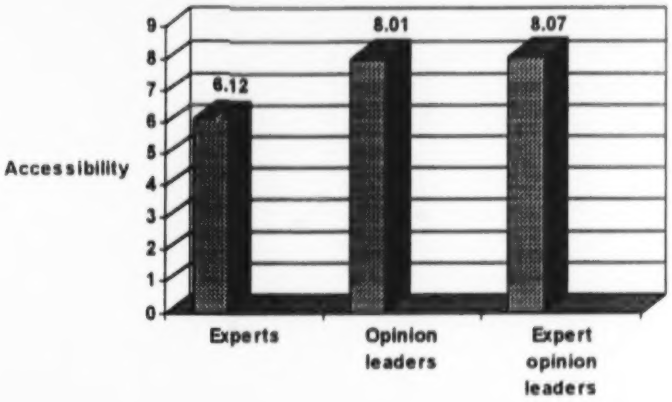


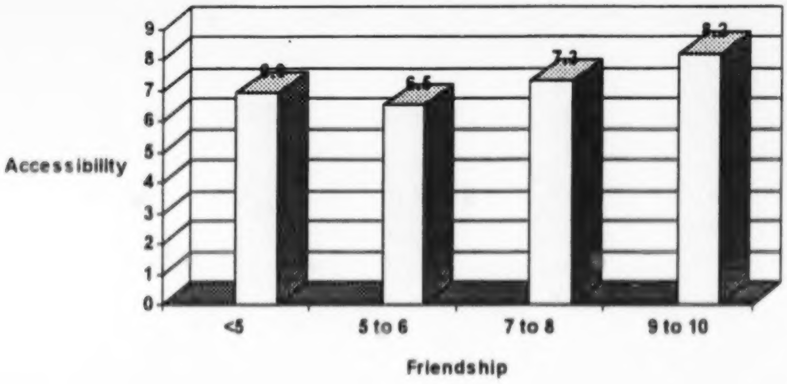
Fig. 2 The mean accessibility rating of persons nominated (a) as experts, (b) as opinion leaders and (c) as experts and opinion leaders

According to Fig. 2, which is a histogrammatical presentation of the average accessibility assessment of persons nominated as experts and as opinion leaders and as both experts and opinion leaders, the experts have a substantially lower accessibility than the opinion leaders (Chi^2 = 30,18; p = 0,0001, d.f. = 4). Persons regarded as experts as well as opinion leaders are, in terms of accessibility, regarded in more or less the same light as opinion leaders . This is borne out by the unsignificant Chi-square (Chi^2 = 5,3; d.f. = 4, p = 0,26) These results also give an indication of the significance of accessibility, which is evidently a different dimension than competence, but obviously essential for the effective flow of information.

If accessibility is a key dimension of opinion leadership, its measurement becomes an important consideration, and in this regard its relationship with related variables is relevant and needs to be explored.

The positive relationships found by Van der Wateren (1987) between accessibility and features such as honesty, fairness, popularity, similarity in attitude and psychic distance, leads to the presumption that friendship may be regarded as being synonymous with or at least closely related to accessibility. If this is the case, friendship could be used as an indicator or barometer of accessibility.

The highly significant relationship (r = 0,54; p = 0,0001) between accessibility and friendship is illustrated in Fig. 3. This relationship is more pronounced above the scale value of five (out of a possible 10), which may be seen as a threshold value beyond which friendship could in fact be used as a parameter of accessibility.



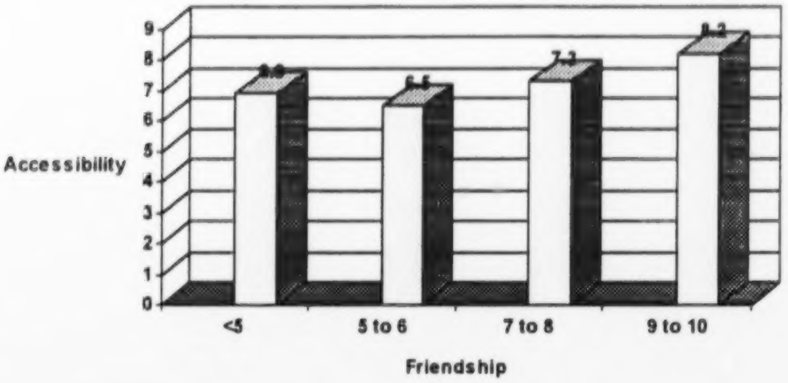


Fig. 3 The relationship between accessibility and friendship as based on mean ratings of respondents

In view of these findings, namely the close relationship between friendship and accessibility, it could be expected that the difference between opinion leaders and experts in terms of accessibility (Fig. 2) would also apply in terms of friendship. This is shown in Fig. 4.

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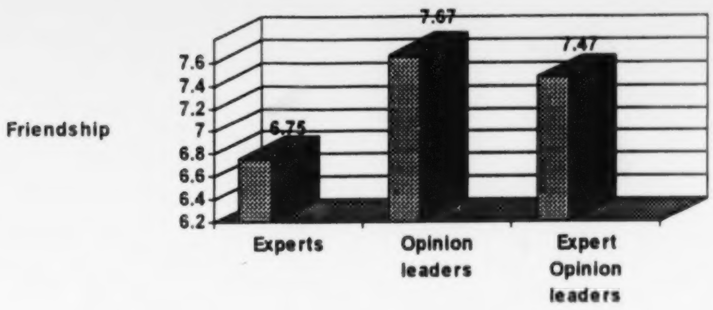

Fig. 4 The mean friendship rating of persons nominated as experts, opinion leaders and as both experts and opinion leaders

The great similarity between friendship and accessibility is clear from a comparison of Figs. 2 and 4. Based on a comparison of chi-square analyses, the difference between the groups is, however, greater in respect of accessibility. This may indicate that respondents are more outspoken (and honest) in their views on accessibility, or that the scale may be more widely interpreted, since a person is perhaps more likely to appraise someone as inaccessible rather than hostile or even as an "enemy". This presumption is confirmed by the finding that 56,8 per cent of the experts were rated lower than 5 out of 10 on the accessibility scale while only 13,6 per cent of the same group were assessed lower than 5 out of 10 in terms of friendship.

A further indication of opinion leadership was assumed to be the reciprocal consultation. This presupposition is based on the assumption that consultation or the provision of advice is a "favor" of the person consulted towards the person receiving the advice (follower). It is believed that, except in a case where a consultation fee is paid, frequent consultation increases the "debt" and consequent "guilt", and thus the reluctance to receive further "favors" from that particular individual, unless compensation can be provided in one way or another. One form of compensation is to provide such a person with advice or information in another field. In this manner, the reciprocity of consultation is expected to increase the accessibility between two individuals and thus the influence of the opinion leader. It is therefore expected that mutual consultation will be much more proportionate between respondent and opinion leader than between respondent and expert. Results confirm this, because in respect of the expert, the average ratio of consultation to being consulted is 6.2 : 3.8, while in the case of the opinion leader it is 5.7 : 4.3.

The relatively intensive consultation frequency, in the case of the expert, is somewhat against expectations, but could be ascribed to the phenomenon that several experts are also true opinion leaders, or that respondents tend to overrate their own influence. The consultation relationship between respondents and those identified as expert opinion leaders, was of the same order, namely 6,3 : 3,7. Noteworthy in this context is the significant relationship (Spearman correlation = 0,137; p = 0,015) between accessibility and reciprocal consultation, which serves as confirmation of the importance of reciprocity of consultation in diffusion or opinion leadership.

Expertise as an indication of opinion leadership would be acceptable, provided there was a correlation between expertise and accessibility. However, as indicated in Table 1, this is not the case.

Table 1 Frequency distribution of respondents according to accessibility and knowledge gap between opinion leader and follower

Accessibility	Respondents per knowledge gap category								Total	
	Absent or negative 0 or less		Small 0 - 1		Fair 2 - 3		Large 3			
	n	%	n	%	n	%	n	%	N	%
Low 1	0	0	9	8,9	17	12,3	7	10,6	33	10,2
2	2	11,8	16	15,8	24	17,4	11	16,7	53	16,5
3	3	17,6	18	17,8	34	24,6	14	21,2	69	21,4
4	6	35,3	19	18,8	33	23,9	20	30,3	78	24,2
High 5	6	35,3	39	38,6	30	21,8	14	21,2	89	27,6
Weighted mean	3,94		3,62		3,25		3,34		3,43	

Chi^2 = 10.96; p = 0,53
r = 0,085; p = 0,14

Both the chi-square (Chi^2 = 10,96; p = 0,53) and the Spearman rank correlation (r = -0,85; p = 0,14) indicate no relationship between expertise (measured as a perceived knowledge gap between nominee and respondent) and accessibility. There is, however, when judging on weighted means a slight tendency for the accessibility to decrease with an increasing knowledge gap between the opinion leader and the follower.

However, if no knowledge gap is perceived by the individual to exist between him and another person, consulting such a person would seem pointless. Therefore, some expertise in the opinion leader is probably a prerequisite for a worthwhile consultative relationship. It could even be expected that a person, given the same perceived accessibility, will prefer or choose to consult the person with the highest perceived level of knowledge.

That a perceived knowledge gap or difference is very important, if not a prerequisite, is supported by the findings in Table 2 which gives the average knowledge gap (using a 10-point assessment scale) between respondents and the different categories of influentials.

Table 2 The mean knowledge gap (based on an assessment on a 10-point scale) between respondents and their nominated influentials

Influentials	Mean knowledge gap
Experts	2,37
Opinion leaders	1,89
Opinion leader-experts	2,44

In all cases there is a significant difference in the level of knowledge. Even in the case of opinion leaders it is appreciable viz. 1,89 scale points or 21 percent.

In the previous analyses, consultation was measured quantitatively rather than qualitatively. However, should frequency or quantity of consultation take place at the expense of quality or significance of consultation, accessibility may also become a dubious measure of opinion leadership. Since it is difficult to determine the quality of consultation or the significance of the advice in respect of the follower, purposeful consultation was taken as an indication of quality - with the supposition that worthwhile advice or advice of value for the individual is sought purposefully - as opposed to more coincidental consultation which is probably more common with high accessibility and frequent contact.

However, the findings in Table 3 indicate that this is not the case. The correlations between the type of consultation (i.e. purposeful or coincidental) and accessibility and expertise (competence) clearly show that purposeful consultation is even more closely related to accessibility than coincidental consultation, while the relationship even tends to be negative in the case of knowledge or expertise.

Table 3 The relationship (rank order correlation) between different types of consultation and accessibility and knowledge respectively

Type of consultation	Accessibility		Knowledge	
	r	p	r	p
Purposeful	0,354	0,0001	-0,175	p = 0,02
Coincidental	0,247	0,0001	-1,127	p = 0,09

The significant negative correlations between knowledge and both purposeful consultation (r = -0,175; p = 0,02) and coincidental consultation (r = -0,127; p = 0,09) confirm once again that knowledge or expertise is not a good measure of opinion leadership.

5. CONCLUSIONS

The findings of this study seem to indicate that competence is, after all, not the only or most important dimension of opinion leadership. The unawareness of this has probably contributed towards an incorrect identification of opinion leaders, namely that experts are mistaken for opinion leaders. The likely conclusion this leads to is that this incorrect identification of opinion leaders has been the major reason for their limited impact in terms of diffusion or the flow of information. If strategies of change are to be based on the involvement of opinion leaders and these are to be used more effectively, great care should be taken in their identification.

As important, if not more important than competence, is accessibility. It appears to be a key issue in opinion leadership and should also feature in the identification of opinion leaders. In this regard the measure of friendship, which is found to be very closely related to accessibility, offers possibilities of measurement. It, however, has the important disadvantage of discriminating less than accessibility seems to do.

More research is essential, especially since opinion leadership was only analyzed from a quantitative and not from a qualitative point of view. In the latter case, competence will presumably feature more prominently.

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ATTITUDES AND PATTERNS OF FARMING IN TRINIDAD

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INTRODUCTION

Definitions of attitudes (Hilgard, 1962; Katz, 1967) agree that they are predispositions to evaluate a person, object or thing. They are subjective, and contain cognitive, affective and behavioural components. Thurstone (1967) defined them as the sum total of a persons' feelings about a topic.

Attitudes are extremely complex and sometimes possess many attributes (Oppenheim, 1979) which add to their complexity. These attributes are often difficult to identify, yet alone measure. They, however, play an important role in the eventual expressed behavioural responses of individuals.

The production of food is also very complex and multifaceted. For farmers operating under conditions of limited and irregular access to the key resources needed for production, this can be quite a challenging exercise. Limited resource farmers in small developing states like Trinidad are thus very likely to hold a wide range of notions, emotions, and perceptions about the sector. The intensities of these psychological inclinations would vary depending on their own particular farm, family or environmental circumstances. Consequently, a wide range of behavioural responses should be expected.

PROBLEM

Local agricultural extension educators and other developmental agents often refer to the "the poor attitude of farmers toward agriculture" as the main reason for their low participation in training programmes and other projects offered to them. As a result, over time fewer programmes are offered to farmers in areas or farming systems where "bad attitudes" are thought to prevail. Indeed these feelings are so pervasive among planners that the National Agricultural Development Plan (1989-1992) set as one of its main objectives "to increase the sense of appreciation for agriculture among farmers".

If farmers in Trinidad have "bad attitudes" toward agriculture as claimed, then one should expect that under normal circumstances farmers would be exiting the industry steadily over time and food production levels would decrease.

However, a review of domestic agricultural production (Draft National Policy for Food and Agriculture, 1993) showed that during the period 1981-1992 there were significant increases in the production levels of vegetables, poultry, milk, pork, rice and fruits, with the production of root crops, legumes and beef remaining fairly constant. Labour force participation in the sector was also constant over the period.

There is a discrepancy between the claims of programme planners and what can be discerned from the data. We believe, firstly, that the claims of "poor/bad attitudes" are misleading; inferred from simplistic assessments based mainly on singular statements of farmers, and tapping more or less one attribute of their attitude. Secondly, the broad generalizations consequently made about all farmers based on these asssessments, regardless of their differing circumstances, and operating systems are biased.

PURPOSE

The objectives of this study were:

(i) to describe a valid and reliable instrument to identify and measure the components that interact to form farmers' attitudes to agriculture, and

(ii) to examine differences in farmers' overall attitude and components of their attitude, based on four key farming pattern variables: geographical location, type of enterprise, enterprise term and part time/full time status.

METHOD

470 farmers were selected by proportionate random sampling to reflect the major enterprises and distribution of farmers across Trinidad. A multiple item - multiple response Likert-type scale formed the main part of the questionnaire. This was used to measure respondents' level of agreement or disagreement to each of the items. The list of items is presented in Appendix 1.

Data were subjected to Likert and Factor analytic techniques to define the scale and identify the operating factors that constitute farmers' attitudes. T-tests were used to examine the differences (0.1 level) in total attitudes and component factors based on the categories investigated.

The investigation reported in this paper forms part of a more comprehensive analysis of farmers' attitudes.

RESULTS

DESCRIPTION OF SAMPLE:

The sample (Table 1) consisted of a majority of farmers in the southern regions (60.4%); mostly crop based

(79.4%); a slight majority involved in short term enterprises (57.2%); and predominantly farming on a part time basis (65.4%).

TABLE 1 : SAMPLE DISTRIBUTION AND OVERALL ATTITUDE DETERMINED BY GEOGRAPHICAL REGION, ENTERPRISE TYPE, ENTERPRISE TERM, AND FARMING STATUS

FARMING PATTERN	SAMPLE SIZE (n=470)	% OF TOTAL SAMPLE	OVERALL ATTITUDES DETERMINED
REGION:			
North	186	39.6	Positive and
South	284	60.4	Different *
ENTERPRISE TYPE:			
Crops	373	79.4	Positive,
Livestock	97	20.6	No difference
ENTERPRISE TERM:			
Short term	269	57.2	Positive and
Long term	201	42.8	Different **
FARMING STATUS:			
Part time	163	34.6	Positive,
Full time	307	65.4	No Difference

* *significant at the 0.05 level*
** *significant at the 0.01 level*

DESCRIPTION OF SCALE:

The final Likert scale had a high reliability (alpha index = 0.976; Guttman's Lambda-3 index = 0.979).

R type factor analysis of the Likert scale, using orthogonal varimax rotation, extracted six factors associated with farmers' attitude toward agriculture in Trinidad; they accounted for 35.2% of the variance of Trinidad farmers' attitudes. These factors were labelled and defined as follows:

Factor 1: Hopelessness - the view that farming has a bleak future; that farmers are powerless to change this direction, and would exit the industry at their earliest convenience.

Factor 2: Farming as a challenge - the opinions that farming is a challenging occupation, is dynamic, and that farmers are proud to be involved in the industry.

Factor 3: Technology beliefs - farmers assessment of the risks versus the benefits of offered technologies, as well as their appropriateness and ease of learning.

Factor 4: Economic orientation - the view that farming should be operated as a business with a singular motive to make profits.

Factor 5: Concerns about threats and obstacles - the opinions that there are simply too many problems in farming, particularly the inadequate level or absence of some of the key factors of production.

Factor 6: Public perception - the view that those outside the farming sector do not see the importance of farming.

DESCRIPTION OF OVERALL ATTITUDES :

Overall attitude: (Tables 2 and 3)

Based on the mean item responses of the total sample, farmers' overall attitude toward agriculture was found to be moderately positive. There were very favourable responses to factor 2 (farming as a challenge), with moderately favorable views on techology beliefs (factor 3) and economic orientations (factor 4). There were very strong concerns about the threats to farming (factor 5). The mean responses to factor 1 (hopelessness) were borderline.

By farming regions: (Table 2)

When segregated by geographical regions, farmers' overall attitudes were mildly positive. Factor 5 (concern about obstacles) generated responses which indicate very strong concerns in both regions, with factor 2 (challenging future) being the most favourable of all the factors. The beliefs held about the technology as well as their economic orientations were both positive .

By time spent: (Table 2)

When segregated by time spent in farming (full time versus part time), the trends were similar. Technology beliefs (factor 3) as well as economic orientations (factor 4) were both positive. There were strong favourable responses to the farming as a challenge factor. Mean item responses to Factor 5 (concern about threats) were low, indicating high concern among both categories; mean item responses to Factor 1 (hopelessness) were only marginally favourable - consequently no firm statement can be made about this factor.

By farming enterprise and farming term: (Table 3)

Comparisons between crop and livestock farmers and short term versus long term enterprises showed similar trends generally. The mean item responses to Factor 1 (hopelessness) however increased, indicating that these farmers generally disagree that agriculture has no hope of recovery.

ATTITUDE DIFFERENCES

Overall (Tables 2 & 3):
Significant differences in overall attitudes were determined between Northern and Southern farmers (0.05 level), and long term and short term enterprise farmers (0.01 level).

Between farmers in Northern and Southern regions (Table 2):
Significant differences were found in farmers' mean total responses to Factor 1 (0.01 level); Factor 2 (0.1 level); Factor 3 (0.01 level); and Factor 5 (0.1 level). These results indicate that the sum total of farmers' feelings in the different farming regions are different about hopelessness, farming as a challenge, the technology, and threats to farming. Farmers in the southern region were inclined to be more positive. Mean responses to 7 items in the scale (items 3, 5, 10, 12, 13, 14 and 16) were significantly different.

Between full time and part time farmers (Table 2):
Significant differences were determined between responses to Factor 3 (technology beliefs). Full time farmers held less favourable beliefs than part time. No significant differences were determined between the mean total responses to the other five factors, suggesting that farmers hold similar attitude intensities regardless of the time they spend on farming activities. However, there were significant differences between 7 items in the scale (items 2, 5, 10, 12, 13, 15 and 16) on this variable.

Between crops and livestock farmers (Table 3):
Mean total factor scores were significantly different (0.001 level) on Factor 3 (technology beliefs); crop farmers held a more favourable perception than livestock farmers of the technology offered. No other factor scores were significantly different. Mean responses to 9 items were significantly different. These were factor 1 (items 3 and 4), factor 2 (item 10), factor 3 (items 12 ,13, 14, 15, 16) and factor 5 (item 21).

Between short term and long term enterprise systems (Table 3):
Statistically significant differences were determined between Factor 2 (0.05 level), Factor 3 (0.01 level), Factor 4 (0.01 level) and Factor 5 (0.1 level). There were no differences between short term and long term operators on their feelings of hopelessness and percieved public's view of farming. Eight item statements also showed significant differences. These were factor 1 (item 2), factor 2 (items 6 and 9), factor 3 (items 13, 14, and 15,) and factor 4 (items 17 and 18).

TABLE 2: **MEAN ITEM SCORES BY FACTORS, MEAN FACTOR SCORES, AND TESTS OF SIGNIFICANCE FOR DIFFERENCES IN MEANS BETWEEN (1) NORTH AND SOUTH REGION FARMERS AND (2) PART TIME AND FULL TIME FARMERS**

ITEM	NORTH REGION	SOUTH REGION	T-val/prob.	PART TIME	FULL TIME	T-val/prob
FACTOR 1:						
Item 1	2.87	3.05	-1.38 (.17)	2.79	2.92	-.075 (.45)
Item 2	3.23	3.12	+1.03 (.30)	2.87	5.20	-2.18 (.03)
Item 3	2.74	2.94	-1.70 (.09)	2.63	2.65	-0.14 (.88)
Item 4	1.97	2.17	-2.06 (.40)	1.89	2.02	-1.05 (.29)
Item 5	2.84	3.28	-3.55 (.001)	3.22	2.87	+2.00 (.04)
Total	13.66	14.56	-2.36 (.01)	13.41	13.67	-5.2 (.60)
FACTOR 2:						
Item 6	3.97	3.92	+0.57 (.568)	3.87	3.93	-0.52 (.60)
Item 7	4.13	4.09	+0.46 (.615)	4.11	4.10	+0.14 (.88)
Item 8	3.83	3.79	+0.47 (.64)	3.70	3.79	-0.82 (.41)
Item 9	3.95	3.82	+1.44 (.15)	3.91	3.77	+1.1 (.27)
Item 10	3.43	3.22	+1.77 (.07)	2.68	3.33	-4.26 (.000)
Item 11	4.21	4.13	+1.25 (.21)	4.21	4.08	+1.46 (.14)
Total	23.51	22.97	+1.72 (.08)	22.50	23.02	-1.18 (.24)
FACTOR 3:						
Item 12	3.09	3.48	-4.15 (.000)	3.56	3.17	+2.94 (.004)
Item 13	3.14	3.55	-4.34 (.000)	3.52	3.31	+1.63 (.10)
Item 14	3.54	3.94	-5.42 (.000)	3.78	3.71	+0.71 (.48)
Item 15	3.81	3.85	-0.56 (.57)	4.01	3.83	+1.91 (.057)
Item 16	2.18	2.46	-2.53 (.012)	2.55	2.24	+2.06 (.04)
Total	15.76	17.27	-5.41 (.000)	17.44	16.29	+2.83 (.005)
FACTOR 4:						
Item 17	3.85	3.86	-0.15 (.88)	3.77	3.88	-0.77 (.44)
Item 18	3.75	3.79	-0.40 (.69)	3.82	3.77	+0.34 (.73)
Total	7.60	7.66	+0.32 (.25)	7.60	7.65	-0.22 (.82)
FACTOR 5:						
Item 19	1.93	1.82	+1.35 (.17)	1.74	1.91	-1.34 (.18)
Item 20	1.97	1.93	+0.53 (.59)	1.78	1.89	-0.90 (.37)
Item 21	1.64	1.52	+1.38 (.10)	1.58	1.61	-0.19 (.84)
Total	5.55	5.27	+1.54 (.12)	5.11	5.41	+1.18 (.24)
FACTOR 6:						
Item 22	4.31	4.40	-1.20 (0.23)	4.33	4.38	-0.51 (.60)
Total	4.31	4.40	-1.20 (0.23)	4.33	4.38	-0.51 (.60)
OVERALL ATTITUDE	72.42	72.15	-2.17 (.031)	70.41	70.46	-0.5 (.96)

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TABLE 3: MEAN ITEM SCORES BY FACTORS, MEAN FACTOR SCORES, TESTS OF SIGNIFICANCE FOR DIFFERENCES IN MEANS BETWEEN (1) CROPS AND LIVESTOCK FARMERS AND (2) LONG TERM AND SHORT TERM FARMERS

ITEM	CROPS	LIVE-STOCK	T-val/prob	LONG TERM	SHORT TERM	T-val/prob
FACTOR 1:						
Item 1	2.95	3.07	-0.75 (.45)	2.89	3.04	+1.13 (.25)
Item 2	3.16	3.14	+0.16 (.87)	3.05	3.24	+1.70 (.09)
Item 3	2.78	3.15	-2.51 (.01)	2.91	2.82	-0.63 (.53)
Item 4	2.13	1.93	+1.67 (.09)	2.01	2.14	+1.34 (.18)
Item 5	3.12	3.05	+0.48 (.63)	3.13	3.08	-0.37 (.71)
Total	14.16	14.36	-0.42 (.67)	14.01	14.35	+0.89 (.37)
FACTOR 2:						
Item 6	3.89	4.10	-2.02 (.14)	3.86	3.99	+1.61 (.108)
Item 7	4.13	4.00	+1.35 (.17)	4.05	4.15	+1.26 (.209)
Item 8	3.79	3.85	-0.64 (.52)	3.79	3.81	+0.28 (.79)
Item 9	3.89	3.77	+1.10 (.27)	3.71	3.99	+3.10 (.002)
Item 10	3.23	3.59	-2.66 (.01)	3.31	3.30	-0.08 (.94)
Item 11	4.16	4.14	+0.28 (.77)	4.12	4.18	+0.90 (.37)
Total	23.11	23.17	-0.94 (.34)	22.85	23.44	+1.90 (.58)
FACTOR 3:						
Item 12	3.40	3.06	+2.98 (.003)	3.25	3.38	+1.42 (.15)
Item 13	3.45	3.11	+3.00 (.003)	3.28	3.46	+1.74 (.07)
Item 14	3.84	3.57	+2.94 (.003)	3.65	3.87	+3.01 (.003)
Item 15	3.88	3.63	+3.07 (.002)	3.74	3.89	+2.28 (.02)
Item 16	2.42	2.13	+2.11 (.036)	2.26	2.42	+1.39 (.16)
Total	16.98	15.50	+4.35 (.001)	16.20	17.04	+2.96 (.003)
FACTOR 4:						
Item 17	3.86	3.84	+0.19 (.84)	3.71	3.98	+2.69 (.007)
Item 18	3.74	3.90	-1.24 (.27)	3.65	3.87	+2.16 (.03)
Total	7.61	7.75	-0.63 (.53)	7.35	7.85	+2.77 (.006)
FACTOR 5:						
Item 19	1.88	1.78	+0.96 (.34)	1.94	1.80	-1.54 (.123)
Item 20	1.93	1.98	-0.46 (.64)	1.98	1.92	-0.69 (.48)
Item 21	1.67	1.40	+2.04 (.04)	1.62	1.52	-1.11 (.27)
Total	5.43	5.17	+1.17 (.24)	5.55	5.26	-1.58 (.12)
FACTOR 6:						
Item 22	4.38	4.26	+1.40 (.16)	4.34	4.37	+0.38 (.70)
Total	4.38	4.26	+1.40 (.16)	4.34	4.37	+0.38 (.70)
OVERALL ATTITUDE	71.71	70.54	+1.21 (.227)	70.33	72.32	2.52 (.012)

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CONCLUSIONS:

The general conclusions drawn are that :

(i) Farmers' overall attitude toward agriculture (based on the factors identified) are generally mildly positive.

(ii) Several factors or components interact to form farmers' attitudes, and these factors vary in intensities and directions, based on farm pattern variables.

It is therefore risky to abandon training and other development programmes for all categories of farmers because of the commonly held notions of their poor attitudes toward agriculture, without a more detailed assessment of their attitudes. The results of such an investigation can be used to inform and target training programmes.

EDUCATIONAL IMPORTANCE

1. Extension training programmes have traditionally focused on the factors identified in the study as most favourable (perception of technology and economic orientation). More effort should be invested in educating farmers to empower themselves to counteract the hopelessness they expressed, and to take charge of their future.

2. The exogenous constraints to farming appear to affect all categories of farmers. There are therefore opportunities to educate farmers in (i) the formation, management and benefits of cooperatives, and (ii) to form associations to act as pressure groups to persuade authorities to assist in areas where they cannot, eg. the regularisation of tenancies.

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APPENDIX 1 : LIST OF ATTITUDE STATEMENTS BY FACTORS

FACTOR ONE: Hopelessness

1. Agriculture has no future in this country.
2. Agriculture is a dead end job.
3. I will change jobs tomorrow if I had a choice.
4. More and more I feel helpless in the face of what is happening in farming today.
5. I will not encourage my children to be involved in agriculture.

FACTOR TWO: Farming as a challenge

6. I am in farming because I can make a significant contribution to the food security in this country.
7. I am happy to let everyone know I am involved in agriculture.
8. I am involved in agriculture because it is a natural way of life.
9. The best future for agriculture lies in the continued use of new technologies.
10. Agriculture is the only occupation for me.
11. Farming is filled with new challenges every day.

FACTOR THREE: Technology beliefs

12. There is a big risk in using the recommendations given on my farm.
13. Recommendations given cannot be used in my system of production.
14. If I use the recommendations given, my production will increase.
15. The recommendations given for use on my farm are quite easy to learn and understand.
16. There is little I can do to influence agricultural development.

FACTOR FOUR: Economic orientation

17. For me, farming is strictly a business.
18. The only real objective in farming is to make a profit.

FACTOR FIVE: Concern about threats and obstacles

19. Inadequate land, water and absence of credit are some of the major concerns in agriculture.
20. There are just too many problems in agriculture.
21. Removal of subsidees is a major threat to the survival of farming in this country.

FACTOR SIX: Public perception

22. People do not recognise the importance of agriculture.

UNLOADED ITEMS EXCLUDED FROM SCALE

23. I will always stay in farming.
24. Agriculture plays an important part in the economy.
25. Government has no clear plan to improve agriculture.
26. After all the national agricultural talks, nothing really changes.
27. Farmers like me have too little say in what should be done.

POSTER SESSION ABSTRACTS -- *Jefferson Room*

#1 POSTER SUBMISSION: WHAT IN THE WORLD IS GOING ON?
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#5 BEYOND THE CLASSROOM: COMMUNICATION TECHNOLOGY LINKING THE MALAYSIAN ADULT LEARNERS
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#6 Bringing Computer Technologies To Extension: Linking Us To The World
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POSTER SESSION ABSTRACTS (continued) -- *Jefferson Room*

#7 USING THE WORLD WIDE WEB TO SUPPORT INSTRUCTION IN UNIVERSITY CLASSES

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#8 THE EFFECTS OF WORLD WIDE WEB INSTRUCTION AND LEARNING STYLES ON STUDENT ACHIEVEMENT AND ATTITUDES

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#9 THE IMPACT OF INTERNATIONAL EXPERIENCE ON LEADERSHIP STYLES OF COUNTY EXTENSION DIRECTORS IN MICHIGAN

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#10 PERCEPTIONS OF SUPERVISORS, TEACHERS, AND STUDENTS REGARDING THE NEW AGRICULTURAL SCIENCE SUBJECT AT UPPER SECONDARY SCHOOLS, MALAYSIA

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#11 EXPERIENTIAL LEARNING IN AGRICULTURE

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#12 PARTICIPATORY INTEGRATED PEST MANAGEMENT IN SUB-SAHARAN AFRICA: MERGING LOCAL AND SCIENTIFIC KNOWLEDGE SYSTEMS

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What in the World Is Going On?

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INTRODUCTION:

> Goal five: Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship. (USDE, 1991, The National Education Goals, America 2000)

The necessity for a global perspective infused throughout all curricular areas is documented, but how does one go about adding or infusing the global view within the school curriculum? From the national perspective, the authors of The National Education Goals, America 2000 (USDE, 1991) specifically outlined the need for everyone to be prepared to understand and be able to compete in a global economy.

PURPOSE:

The mandate for globalization exists; the crux is, how do we respond in local schools for a more globalized or international perspective? Generally, this is considered a "problem" or issue for social studies department personnel to handle, and there appear to be some very good instructional materials available for such use. In some instances, agricultural education personnel have taken a leadership role in developing appropriate curriculum and/or instructional materials (Martin, 1990, 1991) but, once again, the curriculum/instructional materials tend to be very content specific. In addition, not every school has an agricultural program nor is every student required to take agricultural classes. But, does not the need for a globalized curriculum cut across all subject areas and therefore become the responsibility of all?

METHODS AND DATA:

Twenty activities were created and field tested in Pennsylvania with a great deal of success in the limited study. (The results of the pilot testing will be available, and were presented at the 1996 AIAEE conference). The activities were well received, opening the classroom doors and offering an insight to the world around them.

RESULTS AND CONCLUSIONS:

The poster session will highlight the activities and offer the opportunity for individuals to receive copies of the hands-on activities to be infused throughout the middle level and high school curriculums in their areas. It is the author's strong contention that more exciting, hands on materials and activities that globalize the curriculum and bring the world into their classrooms with insight and sensitivity to people and their cultures must be developed for the middle and high school levels before opinions are so strongly formed and minds have become closed.

EDUCATIONAL IMPORTANCE:

The activities are primarily meant for middle level and high school, but the can be tailored for elementary and college level classrooms. We need to enhance and in some cases revitalize today's curriculum to prepare tomorrow's leaders.

IN SEARCH OF A PHILOSOPHY OF AGRICULTURAL EDUCATION FOR PAPUA NEW GUINEA

by
Mr. Arnold C. Parapi
Dr. Roger Steele

ABSTRACT

Educational systems and philosophies of developing countries have more often than not modeled those of their colonial heritage. To this end, Papua New Guinea (PNG), a developing country from the South Pacific, has inherited a system of education from Australia and to some extent the philosophical assumptions of education that resembles its heritage.

A nations' education system reflects those values, beliefs, and aspirations it seeks to instill in its citizens. This in turn provides a framework upon which its human, physical, and financial resources are mobilized and committed so that such ideals can be meaningfully pursued.

The paper/poster session is intended to review educational theories postulated by various philosophers, and to discuss them in the light of the educational context throughout the world. Building on this discussion, an appropriate philosophy of education will be presented for consideration and adaptation for agricultural education in PNG.

The current agricultural education aims and objectives will also be presented in the paper/poster session. Discussion and presentation will include an outline of the administrative structure and government policy guidelines to facilitate understanding of the context for an appropriate philosophy for agriculture education in PNG.

The Women of Uzbekistan: Linking Agriculture, Culture & Education

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Since the Year of the Women in 1975 and the Decade of Women that followed, women leaders around the world have made significant strides in the advancement of women and the girl-child. Last fall, the Fourth World Conference on Women convened in Beijing, China in an effort to continue talks and discussion on critical issues facing women. However, the Beijing Declaration (1995) that was signed last year recognized, "that the status of women has advanced, but inequalities and obstacles remain."

A small, but important delegation was sent from the newly independent Republic of Uzbekistan in Central Asia in an effort by Uzbek President Islam Karimov to increase women in all areas of society. A woman, representing women's issues, has been assigned to every Hakim or district mayor's office. At The Institute of Irrigation & Agricultural Mechanization & Engineers (TIIAME) in Tashkent, a Women's Union, was formed to represent the views and rights of women. In acting on the Platform for Action that was adopted in Beijing, President Karimov and others have taken positive steps, but has it been enough?

As with most transitions, progress takes time. In rural Uzbekistan, women still account for a majority of the labor needed in production agriculture. At the institute mentioned above women professors have attained a status known to few women in Uzbekistan. Like most women, they carry the dual responsibility of a career and caring for a family. With independence in 1991, a resurgence of Muslim religion and the demand on society for change raises the question..."What will this do for the women in Uzbekistan?"

The purpose of this poster presentation will be to showcase the women of Uzbekistan, their problems and concerns. Emphasis will be on impacts to agriculture, education and various aspects of the culture. Although this is a unique society, the women of Uzbekistan represent women with similar problems and concerns throughout the world. The author has participated in a study of the women of Uzbekistan and has traveled in other newly independent countries in the region.

The ISU/SAU Exchange Program: The Student Impact

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The objectives of the Samantha Smith Memorial Exchange were to help provide academic training in agriculture for both Slovak and American students; to build international understanding and friendships among the participants and their communities; and to help youth develop a greater understanding of their host country by learning about its history, culture and society.

Over the past three years nearly 25 students from Iowa State University (ISU) and the Slovak Agricultural University (SAU) have had the opportunity to participate in this student exchange. For many it was a life changing experience..."the value of my experience here (Slovakia) will be carried with me for the rest of my life. I have gained an awareness of how other people in the world live and how other value systems are formed." (Amy Mangold Konoly, 1993 ISU Exchange Student). From enhancing their professional careers to gaining more self-confidence these students have gained a worldly perspective known to few.

The purpose of this poster presentation is to showcase the participants of the ISU/SAU student exchange and their various backgrounds. Furthermore, this poster will take a closer look at the impact this exchange has had on these students, specifically their academic program, cultural awareness, interpersonal skills, and the impact on their professional careers.

Beyond the Classroom:
Communication Technology Linking The Malaysian Adult Learners

by

Mazanah Muhamad and Othman Omar
Malaysia

Abstract

Education plays a critical role in meeting Malaysia's changing situation. This paper deliberates on problems, issues and challenges in adult in continuing education and the future directions of delivery system in post-formal education in Malaysia. It is based on document study on trends and patterns, initiatives and directions at country, regional and global levels in relations to educational and information technologies.

Natural resource-based Malaysia is undergoing a transformation to that of manufacturing/industrialization and services nation. With a robust economic, physical, infrastructure and industrial growth, manpower demand exceeds supply and opens new career disciplines. Capital intensive and high technology in manufacturing and service industries will be used to ease the manpower supply. But there is and will be greater demand for higher and continuing education. The knowledge base is becoming more complex and the half-lives of many disciplines of study become shorter. Higher levels of training and retraining will be sought. Then the key word is access to learning. Unless further learning is made accessible, individuals may not remain employable, organizations may not adapt and nations may lose competitiveness.

In Malaysia, the Government recognizes the need to access to education/training. In 1996 the Government introduced three new education bills. These amendments to the Education Act 1965 open up to include the corporatization of public universities, establishment of new private universities, a central agency governing all institutions of higher education, an accreditation board, and the concept of user pay in education. The move provides more access to education and the citizens could get education/training from the accredited providers of their own choice.

Under the changing Malaysian scenario, the traditional modes of education can no longer cope. This calls for new methods of making learning opportunities accessible to every Malaysia citizen. **How do we provide such learning opportunities - ideally anywhere, anytime, to anyone and on anything?** One alternative is through the telecommunication technology and its advances. Providing education and life long learning activities through the electronic world is the strategy with lots of potentials. It has been observed that the government and the private sector have initiated efforts to develop the following facilities and services:

- Educational and information technologies and telematic technology - development in digital media integration, computers and communication and shift in the learning paradigm.
- Multimedia Super Corridor (MSC). The corridor is a designated area where superhighway infrastructure for the multimedia platform runs. The government hopes that with this initiative, others would develop other telecommunication/multimedia infrastructures in the country and ultimately net and web with each other.
- The Smart School, Multimedia/ Cyber University, and Virtual Campus.
- Learning centered and inductive type of learning in continuing education, with interactive multimedia and learning materials.

The combine drive of government and market forces and the global borderless electronic world would essentially prompted a transformation within many organizations, institutions, and nations. Based on the examination, it can be concluded that beyond the physical parameters of providing education, technology can provide opportunities to enrich adult learners with new learning experiences.

BEST COPY AVAILABLE

Bringing Computer Technologies To Extension: Linking Us To The World

Installation and Training in the Use of Computer Technology Packages

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This poster session will textually and graphically depict the implementation, staff training, and use of computer-based technologies in The Ohio State University Extension Northeast District. This technology is used to enhance the clerical, communications and research capabilities of the specialists and staff members of our district's offices. These enhancements apply not only to The Ohio State University Extension Northeast District, but also will improve the abilities of extension services everywhere. This global impact heightens the importance of bringing computer technologies to extension.

The vision of The Ohio State University Extension Strategic Plan for Communications and Technology is to:

> "strive to become the best--most effective and efficient--communications unit among all such units in any of Ohio's public or private enterprises. We provide Ohioans with readable, relevant educational publications; with professional quality educational television and video productions; information services on the Internet, local networks, diskette, and CD-Rom; and an understanding of Extension's expertise through the news and mass media relations. Through this focus on meeting the needs of the public, we strive to keep the organization relevant and thriving into the twenty-first century."

Previously, Communications and Technology provided the staff to fulfill their vision on a state wide level. The new philosophy is to decentralize the technical and training aspects of completing our technological goals. The position of Extension Associate Computer Educator was created. Our mission at the Northeast District is to enable and enhance the computer technology capabilities of each of our district's county specialists and staff members. The use of tools provided by Extension, Internet research resources, and telecommunications capabilities such as E-mail and Video-conferencing empower each county and individual to fulfill The Ohio State University Extension's vision for communications and technology. This is accomplished through better research, computerized ways of communicating the results of our endeavors, and providing state of the art resources to community members. These skill improvements are not only important to Ohio State but apply to every extension program.

There are certain actions we are taking to complete the mission of the Northeast District. Visits to each county office are made to install and configure a telecommunications and Internet software package called HomeNet. HomeNet has been developed and provided by The Ohio State University Extension Communications and Technology office and includes a dial up network, E-mail software, an Internet web browser, Search tools, and new group readers. The installation is followed by training in the use of the HomeNet package. The training is provided in both group and individual sessions. Other training sessions are used to compliment and augment individual and office skills in the use of clerical tools such as word processors, desk-top publishers, presentation packages and spreadsheets. Additional sessions provide training in the use of business/farm management software, data bases and statistical packages.

Using the World Wide Web to Support Instruction in University Classes

Michael E. Newman, Matt R. Raven, & Paula I. Threadgill

Introduction

The World Wide Web is a rapidly-growing medium that has enormous potential for instruction. At Mississippi State University, faculty and graduate students in Agricultural and Extension Education have developed several Web Pages to support instruction their classes.

Purpose

The purpose of this poster session will be to describe the web pages and their use in instruction and to demonstrate that use to interested observers.

Methods

Various graphical posters will be developed for browsing and the presenter(s) will have a computer that the observers can use to go to the pages and try them out.

Educational Importance

For conference participants who have not made use of the World Wide Web, this poster session should show them what they are missing and how they can make use of it.

The Effects of World Wide Web Instruction and Learning Styles on Student Achievement and Attitudes

Tina M. Day, Matt R. Raven, Michael E. Newman

Introduction

This experimental study determines the effects of World Wide Web (WWW) supported instruction versus traditional instruction on student achievement and attitudes while considering the influence of student learning styles in a university-level technical writing in agricommunication course.

Purpose

The purpose of the study was to determine the effects of the type of instruction on student achievement (on a test and major class project) and student attitudes (toward writing, learning about writing, computers, and the Internet) while also considering the effects of student learning styles.

Methods

The study was an experiment. Students in one section of the class were randomly assigned to either the Web-supported group or the traditional group. Pretests and Post tests were given for the four attitude scales. Students' learning styles were measured using the Group Embedded Figures Test. Achievement was measured using selected questions from an examination and the major class project, a technical report.

Results

A factorial MANOVA analysis indicated statistically significant effects ($p < .05$) for method of instruction on both achievement and attitudes but none for learning styles or for any interaction effects.

Follow-up analyses revealed that students taught using the WWW approach achieved higher than those taught using the traditional approach on both measures of achievement. Also, students taught using the WWW approach had improved attitudes on two of the four measures (writing and the Internet). There were no significant differences for the other two scales.

Educational Importance

This study can benefit anyone considering using the WWW as a support for instruction. The WWW can be used effectively in university-level instruction.

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THE IMPACT OF INTERNATIONAL EXPERIENCE ON LEADERSHIP STYLES OF COUNTY EXTENSION DIRECTORS IN MICHIGAN

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Abstract

The primary objective of this study was to identify the self-perceived leadership styles of county extension directors in Michigan and to determine whether international experience had any impact on the styles. The study utilized a descriptive survey methodology. The study population consisted of all 82 county extension directors in Michigan. The questionnaires used to collect the data were the Least Preferred Co-worker Scale, Leader-Member Relations Scale, Task Structure Scale and Position Power Scale. Statistical techniques used to analyzed the data were frequency distribution, measures of central tendency, regression and cross-tabs.

FINDINGS: Major findings from the study show that 73 county extension directors responded to the survey; the mean age of the directors was 45 years, highest educational level was masters degree, and about 64% practiced a task-motivated leadership style while 23% were relationship-motivated leaders. More than 76% indicated having had international experience and while 23% of them believed that international experience had an impact on the way they led. There was no significant difference between male and female directors leadership styles.

PERCEPTIONS OF SUPERVISORS, TEACHERS, AND STUDENTS REGARDING THE NEW AGRICULTURAL SCIENCE SUBJECT AT UPPER SECONDARY SCHOOLS, MALAYSIA

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The Ministry of Education, Malaysia has reformed the school curriculum in consonant with the aspiration of the general public and the economic development of the country. The new curriculum for secondary schools was introduced in stages beginning the year 1989. In specific discipline, the agricultural science subject had its new syllabus starting in 1993. The new syllabus was supposed to be more technological and integrative compared to the old one.

The purpose of the study was to ascertain feedback from supervisors, teachers, and students regarding the teaching of agricultural science based on the new syllabus. Specifically, the study was to sought the perceptions of respondents with regard to various aspects of the present agricultural science teaching at the upper secondary schools.

The research was a kind of descriptive survey, employing mailed questionnaire as a research instrument. The study included all teachers and supervisors of agricultural science. Student respondents were randomly selected via a stratified method. The instrument was pretested, yielding a reliability coefficient of .80.

A total number of 511 (61%) usable questionnaires were received and analyzed. The response rate was 194 (57.4%) from teachers, 85 (63.9%) from supervisors, and 232 (58%) from students. The results revealed that all respondents were in agreement in terms of their perceptions of the agricultural science project. However, the respondents were in less agreement in their perceptions of the objective accomplishment, subject content, subject performance, implementation, students, and evaluation. The findings also revealed significant differences and associations between selected background variables of respondents with their perceptions.

The research contributes significantly in providing insights regarding the present status of agricultural science subject at upper secondary schools. The research findings also are useful as a basis for further development of the agricultural science subject.

EXPERIENTIAL LEARNING IN AGRICULTURE

Cultural Understanding, Learning Processes, Personal Growth

David Dominguez, David McCormick, Thomas Bruening

The poster will illustrate students' learning experiences in an International class at Penn State. Students studied problem solving in agriculture then traveled to Puerto Rico to conduct a learning actuvity with limited resource farmers.

PARTICIPATORY INTEGRATED PEST MANAGEMENT IN SUB-SAHARAN AFRICA: MERGING LOCAL AND SCIENTIFIC KNOWLEDGE SYSTEMS

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2120 Fyffe Road
Columbus, Ohio 43210

Background:
Integrated Pest Management (IPM) research and extension efforts have met with limited success in sub-Saharan Africa particularly on small and semi-subsistence oriented farms. IPM research in sub-Saharan Africa is characterized as highly fragmented, poorly linked with extension crop protection efforts, and uninformed regarding the socio-economic needs and conditions of small farmers (M'Boob, 1993). Merging farmer, extension and researcher based knowledge systems appears to be vital to successful achievement of IPM objectives. The Integrated Pest Management Collaborative Research Support Project (IPM CRSP) is attempting to redress these constraints through implementation of a participatory approach to the conduct of IPM research.

Purpose:
This poster examines the important functions participatory methods can play in merging different knowledge systems to create an integrated pest management system in Uganda. It is an assessment of four participatory activities conducted by the Integrated Pest Management Collaborative Research Support Project (IPM CRSP) at research sites in Mali and Uganda over the past three years.

Methods:
Four participatory activities have been conducted thus far by the IPM CRSP in collaboration with local agricultural institutions and NGOs. These are a participatory appraisal (PA) of crop and pest priorities; a farmer implemented crop pest monitoring system; selection of proto-typical technologies for on-farm trials; and, farmer evaluation of on-farm trials. The results, successes, and problems associated with each of these activities is assessed and visually displayed. Finally, the participatory IPM research process is evaluated.

Educational Importance:
The Governments of both Mali and Uganda now consider the development of useful and appropriate IPM technologies for small farmers to be a high priority. Institutional constraints and poor understanding of farmers' socioeconomic conditions are posited as important impediments to IPM development. Increasingly advocated to surmount these impediments are participatory strategies that attempt to merge local and scientific knowledge systems. The IPM CRSP is attempting to move participatory research from advocacy to implementation. An open assessment of successes and problems associated with this approach can lead to innovative modification and improvement.

What in the World Is Going On?

Kathleen M. Jones
Physical Science Teacher
Lower Dauphin Middle School
251 Quarry Road
Hummelstown, Pennsylvania 17036

INTRODUCTION:

> Goal five: Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship. (USDE, 1991, The National Education Goals, America 2000)

The necessity for a global perspective infused throughout all curricular areas is documented, but how does one go about adding or infusing the global view within the school curriculum? From the national perspective, the authors of The National Education Goals, America 2000 (USDE, 1991) specifically outlined the need for everyone to be prepared to understand and be able to compete in a global economy.

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METHODS AND DATA:

Twenty activities were created and field tested in Pennsylvania with a great deal of success in the limited study. (The results of the pilot testing will be available, and were presented at the 1996 AIAEE conference). The activities were well received, opening the classroom doors and offering an insight to the world around them.

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Bringing Computer Technologies To Extension: Linking Us To The World

Installation and Training in the Use of Computer Technology Packages

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Michael E. Newman, Matt R. Raven, & Paula I. Threadgill

Introduction

The World Wide Web is a rapidly-growing medium that has enormous potential for instruction. At Mississippi State University, faculty and graduate students in Agricultural and Extension Education have developed several Web Pages to support instruction their classes.

Purpose

The purpose of this poster session will be to describe the web pages and their use in instruction and to demonstrate that use to interested observers.

Methods

Various graphical posters will be developed for browsing and the presenter(s) will have a computer that the observers can use to go to the pages and try them out.

Educational Importance

For conference participants who have not made use of the World Wide Web, this poster session should show them what they are missing and how they can make use of it.

The Effects of World Wide Web Instruction and Learning Styles on Student Achievement and Attitudes

Tina M. Day, Matt R. Raven, Michael E. Newman

Introduction

This experimental study determines the effects of World Wide Web (WWW) supported instruction versus traditional instruction on student achievement and attitudes while considering the influence of student learning styles in a university-level technical writing in agricommunication course.

Purpose

The purpose of the study was to determine the effects of the type of instruction on student achievement (on a test and major class project) and student attitudes (toward writing, learning about writing, computers, and the Internet) while also considering the effects of student learning styles.

Methods

The study was an experiment. Students in one section of the class were randomly assigned to either the Web-supported group or the traditional group. Pretests and Post tests were given for the four attitude scales. Students' learning styles were measured using the Group Embedded Figures Test. Achievement was measured using selected questions from an examination and the major class project, a technical report.

Results

A factorial MANOVA analysis indicated statistically significant effects ($p < .05$) for method of instruction on both achievement and attitudes but none for learning styles or for any interaction effects.

Follow-up analyses revealed that students taught using the WWW approach achieved higher than those taught using the traditional approach on both measures of achievement. Also, students taught using the WWW approach had improved attitudes on two of the four measures (writing and the Internet). There were no significant differences for the other two scales.

Educational Importance

This study can benefit anyone considering using the WWW as a support for instruction. The WWW can be used effectively in university-level instruction.

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THE IMPACT OF INTERNATIONAL EXPERIENCE ON LEADERSHIP STYLES OF COUNTY EXTENSION DIRECTORS IN MICHIGAN

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Abstract

The primary objective of this study was to identify the self-perceived leadership styles of county extension directors in Michigan and to determine whether international experience had any impact on the styles. The study utilized a descriptive survey methodology. The study population consisted of all 82 county extension directors in Michigan. The questionnaires used to collect the data were the Least Preferred Co-worker Scale, Leader-Member Relations Scale, Task Structure Scale and Position Power Scale. Statistical techniques used to analyzed the data were frequency distribution, measures of central tendency, regression and cross-tabs.

FINDINGS: Major findings from the study show that 73 county extension directors responded to the survey; the mean age of the directors was 45 years, highest educational level was masters degree, and about 64% practiced a task-motivated leadership style while 23% were relationship-motivated leaders. More than 76% indicated having had international experience and while 23% of them believed that international experience had an impact on the way they led. There was no significant difference between male and female directors leadership styles.

PERCEPTIONS OF SUPERVISORS, TEACHERS, AND STUDENTS REGARDING THE NEW AGRICULTURAL SCIENCE SUBJECT AT UPPER SECONDARY SCHOOLS, MALAYSIA

By

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The Ministry of Education, Malaysia has reformed the school curriculum in consonant with the aspiration of the general public and the economic development of the country. The new curriculum for secondary schools was introduced in stages beginning the year 1989. In specific discipline, the agricultural science subject had its new syllabus starting in 1993. The new syllabus was supposed to be more technological and integrative compared to the old one.

The purpose of the study was to ascertain feedback from supervisors, teachers, and students regarding the teaching of agricultural science based on the new syllabus. Specifically, the study was to sought the perceptions of respondents with regard to various aspects of the present agricultural science teaching at the upper secondary schools.

The research was a kind of descriptive survey, employing mailed questionnaire as a research instrument. The study included all teachers and supervisors of agricultural science. Student respondents were randomly selected via a stratified method. The instrument was pretested, yielding a reliability coefficient of .80.

A total number of 511 (61%) usable questionnaires were received and analyzed. The response rate was 194 (57.4%) from teachers, 85 (63.9%) from supervisors, and 232 (58%) from students. The results revealed that all respondents were in agreement in terms of their perceptions of the agricultural science project. However, the respondents were in less agreement in their perceptions of the objective accomplishment, subject content, subject performance, implementation, students, and evaluation. The findings also revealed significant differences and associations between selected background variables of respondents with their perceptions.

The research contributes significantly in providing insights regarding the present status of agricultural science subject at upper secondary schools. The research findings also are useful as a basis for further development of the agricultural science subject.

EXPERIENTIAL LEARNING IN AGRICULTURE

Cultural Understanding, Learning Processes, Personal Growth

David Dominguez, David McCormick, Thomas Bruening

The poster will illustrate students' learning experiences in an International class at Penn State. Students studied problem solving in agriculture then traveled to Puerto Rico to conduct a learning actuvity with limited resource farmers.

PARTICIPATORY INTEGRATED PEST MANAGEMENT IN SUB-SAHARAN AFRICA: MERGING LOCAL AND SCIENTIFIC KNOWLEDGE SYSTEMS

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Background:
Integrated Pest Management (IPM) research and extension efforts have met with limited success in sub-Saharan Africa particularly on small and semi-subsistence oriented farms. IPM research in sub-Saharan Africa is characterized as highly fragmented, poorly linked with extension crop protection efforts, and uninformed regarding the socio-economic needs and conditions of small farmers (M'Boob, 1993). Merging farmer, extension and researcher based knowledge systems appears to be vital to successful achievement of IPM objectives. The Integrated Pest Management Collaborative Research Support Project (IPM CRSP) is attempting to redress these constraints through implementation of a participatory approach to the conduct of IPM research.

Purpose:
This poster examines the important functions participatory methods can play in merging different knowledge systems to create an integrated pest management system in Uganda. It is an assessment of four participatory activities conducted by the Integrated Pest Management Collaborative Research Support Project (IPM CRSP) at research sites in Mali and Uganda over the past three years.

Methods:
Four participatory activities have been conducted thus far by the IPM CRSP in collaboration with local agricultural institutions and NGOs. These are a participatory appraisal (PA) of crop and pest priorities; a farmer implemented crop pest monitoring system; selection of proto-typical technologies for on-farm trials; and, farmer evaluation of on-farm trials. The results, successes, and problems associated with each of these activities is assessed and visually displayed. Finally, the participatory IPM research process is evaluated.

Educational Importance:
The Governments of both Mali and Uganda now consider the development of useful and appropriate IPM technologies for small farmers to be a high priority. Institutional constraints and poor understanding of farmers' socioeconomic conditions are posited as important impediments to IPM development. Increasingly advocated to surmount these impediments are participatory strategies that attempt to merge local and scientific knowledge systems. The IPM CRSP is attempting to move participatory research from advocacy to implementation. An open assessment of successes and problems associated with this approach can lead to innovative modification and improvement.